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PITTONIA.

A Series of Papers Relating to Botany and Botanists.

BY

EDWARD L. GREENE.

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CONTENTS.

	Page
Echinocystis § Megarrhiza,	1, 143
West American Species of Trifolium,	4
West American Asperifoliæ, I,	8
The Species of Zauschneria,	23
A New Genus of Asteroid Compositæ,	28
New Species, Mainly Californian,	30
Recent Botanical Literature,	41
Wherefore Pittonia?	51
A Curious Collinsia,	52
West American Asperifoliæ, II,	55
Miscellaneous Species, New or Rare,	60
Botanical Excursion to the Island of San Miguel,	74
Catalogue of the Flowering Plants of the Island of San Miguel,	85
West American Phases of the Genus Potentilla,	95
West American Asperifoliæ, III,	107
American Polemoniaceæ, I,	120
New or Noteworthy Species,	139
Biographical Notice of Dr. Albert Kellogg,	145
New Species from Mexico,	153
New or Noteworthy Species, II,	159
Botanical Literature, Old and New, I,	177
" " " " " II,	184
Botany of Cedros Island,	194

CONTENTS.

LIST OF THE KNOWN SPECIES OF CEDROS ISLAND PLANTS, - 200

SPECIES OF DODECATHEON, - - - - - - - 209

NEW OR NOTEWORTHY SPECIES, III, - - - - - - 215

CONCERNING THE MAKING OF MANY SYNONYMS, - - - - 226

CONCERNING THE CITATION OF AUTHORS, - - - - - 231

BOTANICAL LITERATURE, OLD AND NEW, III, - - - - 238

" " " " " IV, - - - - 245

SKETCH OF THE LIFE OF THURE KUMLIEN, A. M., - - - 250

A NEW BRICKELLIA (By E. R. Drew), - - - - - 260

VEGETATION OF THE SAN BENITO ISLANDS, - - - - - 261

SUPPLEMENTARY LIST OF CEDROS ISLAND PLANTS, - - - 266

CONCERNING SOME CALIFORNIAN UMBELLIFERÆ, - - - - 269

BOTANICAL NOMENCLATURE IN NORTH AMERICA, - - - 276

BARON MUELLER ON EARLY BINOMIALS, - - - - - 280

NEW OR NOTEWORTHY SPECIES, IV, - - - - - - 280

PLANTS FROM THE BAY OF SAN BARTOLOMÉ, - - - - 287

ANALOGIES AND AFFINITIES, I, - - - - - - - 293

NEW OR NOTEWORTHY SPECIES, V, - - - - - - 300

REMINISCENCES OF MAJOR JOHN E. LE CONTE (By Mary Graham), 303

PITTONIA.

A SERIES OF BOTANICAL PAPERS.

By Edward Lee Greene.

Echinocystis § Megarrhiza.

That this group of plants, known to most American botanists as species of *Megarrhiza*, constitute a genus distinct from *Echinocystis* is a doctrine which has been nowhere very seriously defended. Dr. Kellogg was the first to suggest for them generic rank, publishing early in the year 1854 his **Mara muricata*. But only one year later he brought out a second species not as a *Mara* but as an *Echinocystis*.

In the sixth volume of Pacific Railroad Reports, published in 1857, in a catalogue of the plants of Williamson's Expedition, the name *Megarrhiza* first appears in print; but no character is given, or any synonym or citation of a descrip-

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*Erroneously written *Marah*, by Dr. Kellogg who, as if writing an English name, follows the anglicised spelling of it given in the King James version of the Sacred Scriptures; and his mistake is copied by Watson and by Cogniaux. But the final aspirate in such Hebrew words is always omitted in Latin writing; and this not only because its presence is an obstacle to the declension of a name; it does not, even in Hebrew, represent any sound, and could safely be omitted in English as well as Latin.

tion; but Dr. Torrey's name being appended as authority for the names of the two species indicates that he, at that time, was entertaining the thought of founding a genus upon these plants; an opinion which it is evident that he shortly afterwards relinquished; for only a few years later, in preparing his elaborate report upon the Botany of the Wilkes' Exploring Expedition he referred the same plants to *Echinocystis*. As late as 1875, two years or more after Dr. Torrey's death, Mr. Sereno Watson published in the Proceedings of the American Academy, what was indexed as a Revision of *Megarrhiza;* but this paper, so far from being the revision of a previously established genus, is the very first appearance of it as characterized.

Our Pacific American plants differ from the Atlantic type of *Echinocystis* only in their more turgid seeds, hypogæous cotyledons and perennial tuberous roots. In the seeds there is displayed every gradation between the obovate and orbicular, and from nearly globose to much compressed. Eminent botanists who have given special attention to the *Cucurbitaceæ* agree in the opinion that the species in question form no more than a section of *Echinocystis*. In the natural orders most nearly allied, Cactaceæ and Loasaceæ for example, much more striking differences in the character of seeds are allowed in a genus. To take the case of *Mentzelia*, the diversity of seeds, all the way from nearly shapeless to thin, orbicular, flat and winged on the one hand, and to almost exactly cubical on the other, is manifold greater than what we shall have in *Echinocystis* as allowed by Bentham and Hooker and Cogniaux.

It is to be hoped that, in the small matter of the priority of subgeneric or sectional names, no strifes may ever arise; but I can not conjecture what need there was seen to be of naming this § MARA, as M. Cogniaux has done in his admirable monograph, when Bentham and Hooker had, years before, applied MEGARRHIZA to that use.

The species, now in fair number, should be named as follows.

E. FABACEA, Naudin. Ann. Sci. Nat. 4 ser. v. 154 : *Megarrhiza Californica*, Torr. Pac. R. Rep. vi., fide S. Watson, Bot. Cal. i. 241.

E. MACROCARPA, Greene, Bull. Cal. Acad. i. 188.

E. GILENSIS, Greene, l. c. 189.

E. OREGANA, Cogn. Diag. Cucurb. Nouv. ii. 87 & 97 : *Megarrhiza Oregana*, Torr. l. c. fide Watson, l. c.

E. MARA, Cogn. in DC. Monog. Phan. iii. 817 : *Mara muricata*, Kell. Proc. Cal Acad. i. 38 : *Megarrhiza Mara*, Watson, l. c.

E. GUADALUPENSIS, Cogn. l. c. 819 : *Megarrhiza Guadalupensis*, Watson, l. c. The seeds of this are not "subglobose" as described, but round-ovoid, and more compressed than in any other species of the group. They are more than an inch long when well grown, nearly as broad, but less than a half-inch in thickness.

E. MURICATA, Kell. l. c. 57 : *Megarrhiza muricata*, Watson, l. c. : *Echinocystis Watsonii*, Cogn. l. c. 819. M. Cogniaux calmly dispossesses Dr. Kellogg's *E. muricata* of its name and gives it a new one, merely to save the name *muricata* in its connection with a Brazilian plant which he will bring into the genus from without: a kind of practice which, it seems to us, can hardly be condemned too strongly, having nothing to recommend it, and tending only to the further complication of our troubles with synonomy. Although the present plant is one of the oldest species, it remains the only rare one. I met with it myself for the first time, in May, 1886, on the tops of the mountains back of Vacaville, California. The whole plant is very glaucous, the fruit of the size of a lime, and of the same yellow when ripe. The soft spines are, in my specimens, rather numerous, and the seeds are four, not two only as in the original specimen of Dr. Kellogg. The

peduncles, moreover, in my plant are gradually thickened, and strongly so, under the fruit, so that possibly I am including two species under this name.

Some West American Species of Trifolium.

T. olivaceum. Near *T. Macræi*, 1–1½ feet high, erect, with ascending branches, glabrous except a manifest appressed pubescence on the lower surface of the leaves: petioles an inch or two long, with lanceolate, acuminate, entire stipules: leaflets an inch long, cuneate-oblong, obtuse, lightly serrulate or denticulate: heads on elongated naked peduncles, hemispherical in flower, an inch broad and high: calyx-tube a line long, its slightly unequal linear-setaceous teeth 5—6 lines, densely plumose below, gradually less so above and nearly naked at the rather rigid tips: corolla deep violet-purple, only 2 lines long: legume sessile, not exserted from the calyx-tube, striate-nerved, glabrous, 1-seeded.

T. columbinum. Habit of the preceding but rather smaller, silky-pubescent throughout: leaflets with merely crenulate margins: flowering heads conical, more than an inch high and somewhat less than an inch broad at base: calyx-tube less than a line long, the filiform segments 5 lines, soft and densely silky-plumose throughout: corolla 1½ lines long, vexillum white, wings and keel deep purple: legume as in the last, but white-villous at apex.

Both the above new clovers I found in May, 1886, growing quite plentifully, by waysides and along the borders of fields, near the village of Vacaville, hardly fifty miles north of San Francisco. But *T. olivaceum* had been brought by Mrs. Curran, from the opposite side of the Sacramento valley near Penryn, two years before. They are annuals with a striking resemblance to *T. arvense*, completely hiding their small corollas within the mass of elongated, silky calyx-segments. The heads are of a rather bright olive green in the first

species, and of a pale dove color in the second; hence the specific names.

T. TRIFLORUM. Annual, glabrous, a span high with a few slender but firm ascending branches: leaves short-petioled; leaflets 3—5 long, linear-cuneiform, denticulate, truncate or retuse at apex, and cuspidate: stipules spinulose-lacerate: peduncles filiform, several times longer than the leaves, supporting a minutely involucrate 3-flowered umbel: involucres parted into 5—6 subulate segments which little exceed the short pedicels of the flowers: calyx broadly tubular, 2 lines long, scarious and at length transparent between the ten prominent nerves, the equal, triangular-acuminate, entire, pungent teeth one-third as long as the tube: corolla small, purplish, not becoming inflated: legume 2 lines long, glabrous, 2-seeded.

A single specimen, by Mrs. Curran, from near Mt. Diablo, 1883, mixed with *T. bifidum*, which it well resembles, although it belongs near *T. pauciflorum*.

T. RUSBYI. Near *T. longipes*: stems numerous, rather stout, decumbent, a foot high from a deep, somewhat fusiform perennial root: sparingly villous-pubescent: leaflets obovate to narrowly oblong, an inch or less long, obtuse, mucronate, serrulate, deep green above, pale beneath: spike oval or oblong, bracts of the rachis not bristly: flower salmon color, distinctly pedicelled and in age reflexed: calyx-teeth linear-lanceolate, villous-pubescent.

Northern Arizona, collected by Lemmon and by Rusby: also in the San Bernardino Mountains, Southern California, Parish. Well distinguished from *T. longipes* to which it has been referred, by its stout thick perpendicular roots, the pallid lower surface of its leaves and different inflorescence. The roots of *T. longipes* are slender and creeping; its head or spike is round-oval, the flowers sessile and never reflexed, and the rachis has bristly bracts. This is probably the *T.*

longipes, var. *latifolium* of the Botany of California, but has characters not credited to that.

T. EXILE. Near *T. Palmeri* and of the same erect-spreading, freely branching habit: about three inches high: leaflets cuneate-obovate, emarginate, or obcordate, mucronulate, denticulate, the largest hardly more than 2 lines long: stipules lanceolate, acuminate, entire: umbels axillary, short-pedicelled, 5—12-flowered: calyx-tube short-campanulate, half as long as the subequal, triangular-lanceolate, aristate-pointed, scarious-margined teeth: corolla flesh-purple, exceeding the calyx: legume exserted, 2-seeded.

Island of Santa Cruz, 1886.

T. DEPAUPERATUM, Desv.? Size and habit of *T. amplectens*, the heads as few-flowered: involucre nearly obsolete, appearing under the head as a more or less scarious, entire rim: corolla oval in age, somewhat feather-veined, about half filled (lengthwise) by the long-stipitate, 1—2-seeded pod.

Species not as common in California as *T. amplectens* and of somewhat doubtful identity with the South American plant, which has together with a firmer texture (brittle when dry) more herbaceous stipules and calyx, the teeth of the latter less unequal, and longer, nearly equalling the young flowers. It was regarded as distinct by Nuttall and was named by him *T. stenophyllum* (Pl. Gambel. i. 151.) and perhaps that name may have to be restored to it, in which case the *T. stenophyllum* of Boissier may be called *T. lineare*.

T. AMPLECTENS, Torr. & Gray. Fl. i. 319. Usually 3—10 inches high, the branches very slender, but firm (even rigid when dry), numerous, decumbent: involucre of 6—9 linear-oblong, obtuse lobes nearly equalling the calyx: head few-flowered: corolla in age almost obpyramidal, *i. e.* inflated gradually from a narrow base to a broad, truncate summit, somewhat reticulate-veined: pod short-stipitate, 2-seeded.

Abundant on rather dry plains and hillsides: flowers white,

the small keel and wings deep purple : petioles far exceeding the leaves.

T. DIVERSIFOLIUM, Nutt. Pl. Gamb. 152 ? Branches a foot or two long, stout but weak and mostly procumbent : involucre with 5—6 oval lobes much shorter than the calyx : heads many-flowered : corolla twice as large as in the preceding, in age oblong-oval, narrowed about equally at each end, very conspicuously striate : pod long-stipitate, 2-seeded.

Not common, and known to the writer only from brackish marshes bordering San Francisco Bay. It was collected in San Francisco by Dr. Kellogg in May, 1878, and by myself at the following times and places : near Vallejo, 1882 : at 16th Street Station, Oakland, April 30, 1883 : at Belmont, thirty miles south of San Francisco, May 9, 1886. The flowers in this are always bright purple throughout, and the petioles are but little longer than the leaves. Even if it grew away from the salt marshes and with *T. amplectens*, which it never does, it would be recognizable at a glance as distinct, by its twice larger and altogether differently inflated mature corollas. There can hardly be a doubt that this is Nuttall's plant.

T. LACINIATUM. Stems and span long, slender and prostrate : leaflets oblong to linear, truncate and mucronulate at apex, coarsely laciniate-toothed or even lobed to the middle, of thin texture, with a prominent vein running to the apex of each lobe, the body of the leaflet distinctly reticulate-venulose ; stipules very thin and scarious, scarcely even veined : peduncles filiform, assurgent, 3—6-flowered, the involucral rim entire and scarious : calyx very thin and scarious, even to the teeth, the upper pair of which are obsolete, the lower three equal, triangular-subulate ; pod long-stipitate, 4-seeded, quite filling, lengthwise, the linear-oblong, inflated corolla-tube ; seeds corrugated.

Subsaline or alkaline flats of the lower San Joaquin Valley, near Byron Springs, Contra Costa County, collected only by the writer, April 1884. Closely akin to what we call *T. depau-*

peratum, yet of most peculiar aspect, on account of its laciniate leaflets: but the best specific character is that of the long, several-seeded legume.

Some West American Asperifoliæ.

Our commonest Pacific American [1] Asperifoliæ have been hitherto a fruitful source of synonymy; the fate of each species having here to be published first as of one genus, then of another and another; all of which implies either that the genera are hard to define, or that the true generic characters which the plants furnish have been overlooked. In dealing with the earliest known species of them, the Old World botanists erred very naturally and excusably in applying to them those principles upon which the classification of the Old World Asperifoliæ had been based. In Europe and in Asia the genera have floral characters, the corolla itself furnishing some of the best: but not so here where, running through a long list of more than one hundred species which, by their differences of habit would seem likely to represent five or six good genera, the corolla is substantially one thing, the differences being so very slight as to teach that the diagnosis of that organ may almost be omitted as superfluous in descriptions whether of genera or of species: and the corolla in all this vast assemblage of Western North and South American plants is that of the mainly Old World genus, *Myosotis:* hence the common error of early writers who placed them as species of that genus. When the number of them was in-

[1] Ordinal names in botany, no less than the generic and specific ought, it seems to us, to be received according to priority. The one here written was proposed by Haller, accepted by his contemporaries, including such men as Dillenius, and has never yet been quite displaced by the more recent Jussieau name Borragineæ; for even that most eminent writer on the order, Lehmann, continued always to use the older name, notwithstanding that the De Candolles in their great general work, destined to wield such wide and lasting influence, chose to support the

creased, and their fruits began to be more attentively considered, it was found that they must be excluded from *Myosotis*. I apprehend that the difficulty which more recent botanists have experienced in dealing with them, has come of a too exclusive dependence upon certain of their fruit characters. As authors of the early part of the century erred by looking to the corolla alone, so, it appears to us, those of fifty years later have gone astray by regarding too exclusively the surface and the insertion of the nutlets. Between the two it is hard to say which of these kinds of character is the less available for generical distinctions. I account of both as nearly worthless for that purpose, in so far as relates to species which were until recently referred to *Eritrichium*. Assuredly what seems to me to be the most forced and artificial genus that has been proposed in this alliance is *Echidiocarya*, having every aspect and every character of *Plagiobothrys* except that there is a stipe between the scar, or point of attachment to the gynobase, and the body of the nutlet. But precisely the same thing recurs in that group of species, very unlike *Plagiobothrys*, which, in the Supplement to the Synoptical Flora of North America is neatly set apart as section Myosotidea of *Krynitzkia*, in one species of which, and that so near the *Eritrichium Californicum* of De Candolle as to have been hitherto confounded with it, the stipe is not only present, but even more distinct in its cut, though less elongated, than that which gave its supposed character to *Echidiocarya*. We are, then, compelled to make allowance here, in each genus, for every gradation between a perfectly sessile nutlet with scar depressed and hollowed, and a stipitate one. Professor Gray has indeed, in the Supplement referred to, remanded to *Plagiobothrys* two of the stipitate species which

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more modern one. I am glad that, among contemporary authorities, one of Baron von Muller's great fame adopts the original and, I may add, the most appropriate and convenient ordinal appellative for these plants. It is one which, like Cruciferæ, Compositæ and others, has the literary advantage of not ending in that awkward combination of successive vowels which is a serious objection against many of the names of comparatively recent date.

he had placed in *Echidiocarya*, leaving the original plant alone to represent the genus he had named. This he has done upon a supposition that the separation of the four nutlets into pairs, by a partial union of two stipes, is of generic import. That character is, as I shall show farther on, not only inconstant in the species, but even almost exceptional in the individual specimen when well developed. He is likewise unaware that in a very different plant which he has placed in *Plagiobothrys*, *i. e.*, *Sonnea hispida*, the nutlets are not occasionally but always joined in pairs by their soft caruncular stipes, and so fall away from their gynobase. In even that long known species whose latest synonym is *Krynitzkia Jamesii*, the nutlets, far enough from the stipitate, are separated into pairs by a manifest interval: so that no kind of pairing off of nutlets can be construed as meaning, generically, anything at all.

As for the surface characters of nutlets, *Amsinckia* should have taught authors the worthlessness of them, when generically considered, in the subtribe Eritrichieæ. None of the genera are better defined or more natural than this. The limits of no other have remained so entirely unquestioned: but the nutlets vary, through the different species, from a polished and shining smoothness to strongly rugose, sharply muricate, and even echinate.

In the genus which I here propose as new under the name *Allocarya*[2] the kind of diversity referred to is somewhat greater than in *Amsinckia;* but the species are far more numerous, and all of them agree admirably in that best mark of a good and natural genus, the habit; to which there is to be conjoined a character very rare in the order, if not indeed unique, that of the lower leaves being not only opposite, but distinctly connate-perfoliate. But, to return to matters appertaining to the fruit: we have in *Allocarya* fruiting calyx and pedicels of a nature most unlike those of *Plagiobothrys* or any other of the various groups of plants formerly included

[2] In allusion to the extreme diversity of the species as regards the surface of the nutlets.

in *Eritrichium* : and it is precisely these modifications of the fruiting calyx and its stalklet, whose value has been conceded in generifying Old World Asperifoliæ, which both British and American authors have ignored in their treatment of the West American Eritrichieæ. The pedicels of *Allocarya* are from the first turbinate beneath the calyx, become indurated with age, and are persistent until the whole plant decays. In *Krynitzkia*, when duly restricted we shall have still a large genus in which the pedicels are filiform and so neatly articulated with the branchlet as to fall away promptly, on the maturing of the fruit, leaving a naked rachis. *Allocarya* is, in truth, much more nearly allied to *Plagiobothrys* than to *Krynitzkia*. Its nutlets are in general, not very different, being rugose, keeled more or less both dorsally and ventrally, and showing distinct lateral angles. In the first two species of the proposed new genus these angles are not obvious, owing to a singular misplacement of them, if one may say so : for they are drawn forward, as it were, and folded one over the other, in front of, and thus entirely conceal the proper scar or point of insertion, as well as the lower part of the ventral keel. In the third species they come forward after the same fashion, but only far enough to form a narrow groove in which the scar and keel lie exposed. In most of the other species the lateral angles are, as in *Plagiobothrys*, where lateral angles ought to be. In *Krynitzkia* the scar is itself a groove ; no species have a keeled nutlet, and lateral angles are exceptional ; for most of the so called Krynitzkias which have that appendage are probably to be excluded from the genus. In regard to the species of *Allocarya*, my long continued field observations lead me to suspect them of hybridizing freely, in some localities ; or, as most botanical writers would say, they are confluent, or very hard to define. They are, however, less so than the Amsinckias, and their nutlets, if the scar and ventral keel be carefully considered, furnish fair characters. The genus *Somea* is taken out of *Plagiobothrys* on account of the peculiar, softer than cartilaginous, caruncular scar. This is the same thing in the two groups

except as regards the form of it, and the plants all agree in habit, as well as in a coarser pubescence, to constitute a genus very unlike *Plagiobothrys*.

ALLOCARYA.

Pedicels turbinate-thickened and more or less distinctly 5-angled under the calyx, persistent, more or less indurated in age. Calyx 5-parted to the base; segments spreading, and in fruit somewhat accrescent. Corolla salver-form with short tube, yellow throat and white limb. Nutlets ovate or lanceolate, crustaceous, opaque or vitreous-shining, smooth or variously tuberculate and rugose, muriculate or even strongly glochidiate, often carinate on one or both sides, attached by an infra-medial or basal, concave, but sometimes raised and stipitate scar, to a low gynobase. Low herbs, mostly annual, with linear entire leaves, the lowest always opposite and connate-perfoliate: branches numerous and commonly depressed, racemose throughout almost their whole length. Plants vernal in their flowering, confined to low, moist grounds, herbage usually light green and somewhat succulent, more or less hirsute, leaves linear and entire.—Species of *Myosotis*, *Lithospermum* and *Eritrichium* of various earlier authors, and of *Echinospermum* and *Krynitzkia* of Asa Gray.

* *Annuals; pubescence setose.*

⊢ *Racemes loose and more or less leafy-bracted.*

1. A. LITHOCARYA. Stem erect, a foot high, simple or parted below the middle into a pair of slender, loosely racemose branches: pubescence sparse and appressed except on the ferruginous-hirsute calyx: lower pairs of leaves joined at base into sheaths 2—3 lines long: lowest pedicel (in the fork) a half-inch long, the others about a line, all slender, the lower subtended by leafy bracts: segments of the calyx lan-

ceolate, in fruit 2 lines long : nutlets ovate, more than a line long, smooth and vitreous-shining, lightly carinate on the back, and also down the ventral face, but the keel hidden, from above midway downward, by a groove-like infolding of the lateral angles; scar linear but similarly hidden.—*Krynitzkia lithocarya*, Gray, Proc. Am. Acad. xx. 265 ; Syn. Fl. Suppl. 423.

Known only from Lakeport, Lake County, California, where it was collected by Mrs. Curran, in May, 1884.

2. A. Hickmanii. Very slender, diffuse, the filiform racemose branches 6—10 inches long : calyx a line long, the lower on longer, the upper on shorter filiform pedicels : corolla a line or more broad : nutlets ovate, hardly a half-line long, dark colored, tuberculate but not rugulose, ventral face as in the preceding, namely, the scar and all but the upper part of the keel hidden within a completely closed groove.

Southern part of Monterey County, Mr. J. B. Hickman, 1886. Species exactly intermediate between the last and the next, having the peculiar ventral face of the former, with the pubescence, inflorescence and comparatively large corollas of *A. Chorisiana.*

3. A. Chorisiana. Like *A. lithocarya* in foliage and pubescence, but twice as large, freely branching, the branches at length reclining : racemes elongated, loose, leafy below ; pedicels filiform, 4—8 lines long : calyx little accrescent, the campanulate segments about a line long : corolla 3—5 lines wide : nutlets ovate, little more than a half-line long, brownish and dull, carinate ventrally only, the keel and scar closely approached, but not covered by the lateral angles, the obtuse rugæ of the back running into more or less favose meshes among the numerous minute granulations: scar linear, short.—*Myosotis Chorisiana*, Cham. & Schlecht. Linnæa. iv. 444 : *Eritrichium*, DC. Prod. x. 130 ; Gray, Proc. Am. Acad. x. 56, Bot. Cal. i. 525, Syn. Fl. 191 ; E. *connati-*

folium, Kell. Proc. Cal. Acad. ii. 103. fig. 51 : *Krynitzkia*, Gray, Proc. Am. Acad. xx. 267 ; Syn. Fl. Suppl. 424.

Common in moist grassy lands about San Francisco Bay. One of the very few species whose corollas are not minute but large enough to be showy ; easily distinguished from all the others by its conspicuously pedicelled flowers. Its affinity with *A. lithocarya* is indicated even in the nutlets, the lateral angles of which are drawn forward very close to the ventral keel, forming a groove along it, although not enclosing any part of it.

4. A. DIFFUSA. Pubescence light, closely appressed : branches procumbent, a foot or less in length, loosely racemose from the base, the raceme leafy to the middle at least ; lowest pedicel a half-inch long, the others hardly a line : calyx widely spreading, corolla small : nutlets dark brown, broadly ovate, incurved, ¾-line long, ventrally carinate down to the supra-basal, oblong-lanceolate scar, the back with rather sharp granulations and rugæ, the latter favosely confluent.

San Francisco, in grassy lands about the U. S. Marine Hospital, April, 1886. In habit most resembling *A. Chorisiana*, but the corolla minute and pedicels very short. Nutlets, with their sharpened rugæ and granulations, inclining toward those of the species which immediately follow.

5. A. TRACHYCARPA. Size and habit of the last, but more branching and decumbent rather than procumbent, rough with a coarser and somewhat spreading pubescence : racemes less open, leafy almost throughout : segments of calyx linear, widely spreading : corolla very small : nutlets ovate, straight, carinate on both sides, the dorsal keel and nearly straight transverse ruga dentate-interrupted ; scar suborbicular, nearly basal.—[3] *Krynitzkia trachycarpa*, Gray, Proc. Am. Acad. l. c.

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[3] A. ULIGINOSA. Stem erect, a foot or more high, simple below, where it is clothed with many pairs of connate-sheathing leaves : pubescence short and very sparse except on the calyx, closely appressed : racemes several, naked, rather dense ; lowest pedicels 2 lines long, the rest 1 line

266, and Syn. Fl. Suppl. l. c. 423, as to the Californian plant only.

In the lower part of the valley of the San Joaquin, collected by the writer near Tracy, 1884, and a year later near Antioch, by Mrs. Curran: also said by Prof. Gray, to occur in Mr. Brewer's collection from Sonoma County.

A. ECHINOGLOCHIN. Habit, pubescence and inflorescence of the last, but a coarser, larger plant; nutlets a line long, ovate, straight, carinate ventrally down to the nearly basal ovate scar, the back covered with coarse granulations and stout barbed prickles $\frac{1}{4}$—$\frac{1}{2}$-line high, these distinct at base or more or less confluent into walled reticulations, the latter sometimes strongly developed and the prickles themselves correspondingly reduced or even nearly obsolete.—*Echinospermum* (*Echinoglochin*) *Greenei*, Gray, Proc. Am. Acad. xii. 163; Syn. Fl. ii. 190.

Common on moist plains everywhere from San Diego to Oregon. Quite variable in the character of the surface of its nutlets, apparently confluent with the last species, singularly and persistently dissociated by Prof. Gray, from its manifestly nearest relatives. The species was discovered, by the present writer, in 1876, near the northern boundary of California, but has since proved common over a vast stretch of the Pacific Coast region. In transferring this to what I am sure is its proper genus I have felt at liberty to choose between the subgeneric and specific names imposed by Dr. Gray, selecting, for obvious reasons, the former.

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or less: corolla 3 lines broad: nutlets as in *A. trachycarpa*, except that the rugæ are sharper and the body muriculate rather than granulate.—*Eritrichium uliginosum*, Philippi in herb. Cal. Acad.: *Krynitzkia trachycarpa*, Gray, l. c. as to the Chilian specimens doubtless.

A South American species with the naked racemes, large corolla, erect stems and whole aspect of the Oregonian *A. Scouleri*, but nutlets different and more like those of *A. trachycarpa*. Whatever the *Lithospermum muricatum* of R. & P. may be, this plant does not at all answer to their description of that.

7. A. HUMISTRATA. Stout and succulent, the branches mostly prostrate, a foot long, racemose throughout: pedicels short and stout, commonly deflexed: calyx lobes linear-spatulate, in fruit greatly enlarged (4—6 lines long) and turned to one side, standing vertically in a row: corolla small; nutlets ovate lanceolate, ¾-line long, straight, carinate ventrally down to the nearly or quite basal, rounded scar, the back with very minute muriculations and sharp-edged transverse rugulæ which commonly develope short and minute penicillate bristles.—*Eritrichium Californicum* var. *subglochidiatum*, Gray, Bot. Cal. i. 526 and Syn. Fl. 191 in part, also of *Krynitzkia*, l. c. 266, but excluding the plant of the Rocky Mountain region.

Frequent from San Diego throughout the State, growing in moist places, flowering in early spring, the branches in age becoming indurated.

8. A. SCOPULORUM. Much smaller and more slender than the last, but somewhat succulent, the branches depressed, 1—6 inches long, leafy-racemose throughout, the floral leaves linear, elongated: segments of the calyx linear not accrescent, or turned aside: nutlet a half-line long, ovate-lanceolate, lightly carinate ventrally down to the almost basal, ovate scar, also dorsally toward the apex, the back otherwise muriculately or even somewhat penicillately roughened and rugulose, the rugulæ running well into favose meshes.—*Eritrichium Californicum*, var. *subglochidiatum*, Gray, l. c. (and *Krynitzkia*, l. c.) as to the plant of Colorado, Wyoming and Montana.

Very distinct every way from the last; far more like the next.

9. A. PLEBEIA. Branches depressed, a span or more long: floral leaves linear-oblong: calyx slightly accrescent: nutlets ovate, a line long, carinate ventrally down to the ovate scar, the back rugose-reticulate, glabrous.—*Lithospermum plebeium*, Cham. & Schlecht. Linnæa. iv. 446: *Eritrichium*, A DC. l. c. 133; Gray l. c.; *Krynitzkia*, Gray l. c.

Sea shores of the Aleutian Islands ; also at Humboldt Bay, California, Carl C. Marshall, 1886. The sole species whose nutlets, being rugulose, are not at all granulate or muriculate.

10. A. HISPIDULA. Diffusely branching, 4—8 inches high, canescent with a short, setose-hispid pubescence ; racemes naked or leafy-bracted : calyx not accrescent : akenes ovate, opaque, $\frac{3}{4}$-line long, carinate on both sides, the back very lightly so and beset with a minute muriculation, the transverse rugulæ few and not prominent ; scar almost basal, ovate-oblong.

From the San Bernardino Mountains, Cal. (Parish, No. 1470) northward to Oregon (T. J. Howell), referred to "*Eritrichium Californicum*," from which plant it differs in its rough pubescence, and muriculate rather than granulate akenes.

11. A. CUSICKII. Size and habit of *A. hispidula*, but racemes more open and leafy, the pubescence equally copious but more appressed : nutlets vitreous-shining, ovate-oblong, $\frac{1}{2}$-line long, carinate ventrally only, the back with crowded depressed rugæ and few tuberculations : scar almost basal, narrowly linear and sharp-edged.

Union County, Oregon, 1883, W. C. Cusick, also at Reno, Nevada, 1884, Mrs. Curran. Exactly like the preceding in aspect, differing from it in the character of its nutlets, the scar of which is altogether peculiar. There is a South American species quite like these two new ones in general appearance, but with very dissimilar nutlets.[4]

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[4] A. PROCUMBENS. Nutlets ovate-trigonous, rugulæ rising here and there into sharp points, scar infra-medial, deltoid in outline and excavated. — *Eritrichium procumbens*, DC. l. c.; *Plagiobothrys procumbens*, Gray l. c., also

A. HUMILIS = *Myosotis humilis*, Ruiz & Pavon. Fl. Per. ii. 5 ; *E.? humile*, DC. l. c., and

A. SESSILIFOLIA = *Eritrichium sessilifolium* DC. l. c.,

All are considered good species by Dr. Philippi who, as a resident Chilian botanist has the best means of knowing : but, in our herbaria they appear to be separated on rather slight grounds and may eventually be united under the specific name *humilis*, that being the oldest.

Issued February 26, 1887.

12. A. PENICILLATA. Erect, slender, a foot high, sparingly branching, all the primary and most of the secondary branches in opposite pairs; sparingly setulose-hispid: racemes naked except a few bracts at base: calyx slightly accrescent, spreading in fruit: corolla very small: nutlets ovate-oblong, a line long, carinate from a little below the apex around it, and down the elongated, nearly linear but open and excavated scar; rugulæ transverse, acute, beset with minute short setæ in numerous penicillate tufts of three or four.

Donner Lake in the Sierra Nevada, Cal., August, 1883, collected only by the writer.

In the character of its nutlets this is much like *A. humistrata*, although the scar is different, and the oppositely branching habit of the plant is altogether peculiar in the genus.

13. A. AUSTINÆ. Erect, slender, a span high, simple or sparingly branching, almost glabrous, except the calyx which is somewhat villous: leaves narrowly linear, much elongated ($1\frac{1}{2}$–3 inches); calyx not accrescent: nutlet light colored, ovate-acuminate, more than a line long, strongly carinate on both sides, the dorsal keel and margins surmounted by stout prickles which, from midway upwards are strongly glochidiate, body of nutlet otherwise densely tuberculate; scar supra-basal, sharply triangular, excavated.

A single specimen, collected in Butte County, Cal., 1883, by Mrs. R. M. Austin: species bearing considerable resemblance to *A. Echinoglochin*, but nutlets of extremely different and very peculiar character.

++ *Spicate racemes bracteless and more dense.*

+++ *Corolla large, i. e., 3—6 lines wide.*

14. A. SCOULERI. Erect or ascending, a foot high, pubescence as in the last: corolla 3 lines wide: calyx-segments erect in fruit and not accrescent: nutlets ovate, $\frac{1}{2}$-line long, dark colored, carinate on both sides at apex and ventrally

down to the linear-oblong scar, dorsal surface obviously granulate but very indistinctly rugulose. — *Myosotis Scouleri*, Hook. & Arn. Bot. Beech. 370: *Eritrichium Scouleri*, A. DC. l. c.: *E. Scouleri*, Gray l. c. and *Krynitzkia* l. c.

Hillsides, Oregon and northward.

15. A. STIPITATA. Ten to eighteen inches high, erect and and simple, or with ascending branches from the base: herbage light green, apparently glabrous, yet roughish, slightly, with sparse and short setæ: calyx nearly sessile, segments spreading, foliaceous and accrescent, in fruit often a half-inch long: corolla short-funnelform, $\frac{1}{4}$ — $\frac{1}{2}$-inch broad: nutlets ovate-lanceolate, carinate for the whole length of the ventral face, and a little past the apex, the back covered with blunt tuberculations and interrupted transverse rugæ; scar exactly basal, roundish and joined to the body of the nutlet by a **short but distinct stipe.**

This is the commonest of all the species in the central part of California, being abundant in all moist meadow lands, and along the margins of pools and ditches. It is variable in size of flowers and nutlets, and the more slender states when in flower only might pass for *A. Californica*; but the nutlets, whether large or small, never fail to display their very marked peculiarities. By their singular basal and stipitate insertion their apices are thrown apart, so that, in the calyx they are **always divergent from one another.**

16. A. COOPERI. Like the last in habit and variability in size of flower and fruit, but hispid with an abundant spreading and setose pubescence: calyx-segments narrowly oblong, little accrescent: corolla salver-form rather than funnelform: nutlets slightly carinate ventrally only, back as in the last species, scar supra-basal narrowly oblong. — *Eritrichium Cooperi*, Gray, Proc. Am. Acad. xix. 89; *Krynitzkia Cooperi*, Gray, l. c. xx. 267, and Syn. Fl. Suppl. l. c.

Apparently restricted to the Mohave Desert, Cal.

++ ++ *Corolla small, as in most species.*

17. A. CALIFORNICA. Slender, sparingly setose, diffusely branching, the branches 6—15 inches long, weak and reclining: racemes with few bracts at base : calyx-segments slender, not accrescent, spreading in fruit : nutlet ovate, $\frac{3}{4}$-line long, keeled and rugulose and granulated as in the last ; scar roundish, nearly basal.—*Myosotis Californica*, Fisch. & Mey. Ind. Sem. Petrop. 1835 : *Eritrichium Californicum*, DC. l. c., Gray l. c. excl. var. and also *Krynitzkia.*

Common in the central and northern parts of the State, from the coast to the foot-hills of the Sierra Nevada ; when in flower only rather hard to distinguish from the more slender forms of *A. stipitata.*

* * *Perennial ; soft to the touch, the dense pubescence villous.*

18. A. MOLLIS = *Eritrichium molle*, Gray, Proc. Am. Acad. xix. 89 ; *Krynitzkia*, Gray l. c.

Sierra Nevada, where it has been collected only by Mr. Lemmon. The plant from near Visalia, described as rougher in its pubescence, is not known to us.

PLAGIOBOTHRYS, Fisch. & Mey.

Racemes spike-like, elongated, loose, naked or leafy-bracted ; pedicels very short, filiform, persistent. Calyx 5-cleft or -parted, closed or campanulate, or even stellate-spreading and more or less accrescent in fruit, when not too deeply cleft irregularly circumscissile near the base. Nutlets ovate or indistinctly cruciform in outline, carinate on both sides toward the apex, usually with well defined lateral margins, the back very regularly transversely rugose, smooth or roughened between the rugæ ; insertion almost medial on a depressed gynobase : areola or scar rounded, hollow or solid, not rarely stipitate. Rather large but slender annuals with most of their leaves in a close radical tuft, the elongated

branches usually trailing over the ground and flowering from the base. Herbage never scabrous, commonly soft pubescent, imparting a violet stain.—Ind. Sem. Hort. Petrop. ii. (1835) 46, and A. DC. Prod. x. 134: Gray, Proc. Am. Acad. xx. 281, excluding AMBIGUI and ANOMALI.

To the genuine species defined by Prof. Gray, the following are, in my judgment, to be added.

P. MICROCARPA. Villous-canescent, erect, 6—10 inches high: calyx little more than a line long, cleft to the middle, closed over the fruit, nearly sessile, some of the lower leafy-bracted: nutlets broadly ovate, only a half-line long, dull gray, faintly wrinkled, not at all granulate.

Butte County, California, May, 1883, Mrs. R. M. Austin. Like a small *P. canescens* in aspect, but strictly erect, the nutlets very different and the smallest in the genus.

P. CANESCENS, Gray, var. APERTUS. Not canescent, green and rough-hirsute: branches a foot or two long, procumbent, floriferous throughout, most of the pedicels leafy-bracted: calyx deeply cleft, accrescent, the triangular-lanceolate segments stellate-spreading even before maturity: nutlets as in the type.

Plains of the upper San Joaquin, collected by the writer in 1884, appearing like a very distinct species, but specimens from still farther southward by Parish seem intermediate: and so do others of Rattan's gathering near San Jose.

P. PRINGLEI.—*Echidiocarya Arizonica*, Gray, Proc. Am. Acad. xi. 89, and Benth. & Hook. Gen. ii. 854.

Between the nutlets of this and those of the other stipitate species there is no considerable difference but that of a perceptibly greater length of stipe. Their cohering in pairs is very far from being constant, and altogether an accident of those which grow on the best fed part of the plant, namely, the lowest part of the branches, very near the root. Here they are joined above midway, but higher up the union is far

less marked, while on more than half the length of each racemose branch I find the four nutlets wholly distinct. The habit of the plant is perfectly that of the other prostrate species of *Plagiobothrys*.

SONNEA.

Inflorescence leafy, glomerate or rarely paniculate-racemose; pedicels filiform, not deciduous. Calyx 5-parted to the base, not accrescent, open in fruit. Nutlets ovate and rounded or ovate trigonous with lateral angles, carinate ventrally at apex, with or without a dorsal ridge, smooth or tuberculate-roughened; the insertion medial or supramedial by a white, soft-cartilaginous or almost albuminoid, rounded or elongated caruncular scar to a pyramidal or depressed gynobase.—Low but robust scabrous and bristly annuals with ascending, leafy branches and no radical tuft of leaves: herbage not staining.—Genus confined to the eastern slope of the Sierra Nevada and the adjacent parts of Nevada and Arizona, dedicated to Mr. Charles Frederick Somne, of Truckee, California, who gives promise of becoming as intelligent a botanist as he has been a diligent collector and field-observer in that region of country to which these plants belong.

* *Nutlets rounded, the soft but stipe-like scar globose and supramedial.*—(PLAGIOBOTHRYS § HYPSOULA, Gray).

1. S. GLOMERATA. —*Plagiobothrys glomeratus*, Gray, Proc. Am. Acad. xx. 286. & Syn. Fl. Suppl. 432.—The nutlets in this species are fixed just beneath the apex and all four are clearly separate from one another.

2. S. HISPIDA. —*Plagiobothrys hispidus*, Gray, l. c. In this the gynobase has but one complete line of separation and the nutlets are in two pairs, each pair being, moreover, coherent by a partial union of their almost gelatinous stipes, so that

they fall away together. The species is therefore, among its congeners, the counterpart of *P. Pringlei* in *Plagiobothrys*.

* * *Nutlets angular, the cartilaginous carunculer scar elongated and keel-like, medial.*—(PLAGIOBOTHRYS * AMBIGUI, Gray).

3. S. KINGII.—*Eritrichium Kingii*, Watson, Bot. King. 243. t. 23; Gray, Syn. Fl. 192: *Plagiobothrys Kingii*, Gray, Proc. Am. Acad. xx. 281, and Syn. Fl. Suppl. 430.

4. S. JONESII.—*Plagiobothrys Jonesii*, Gray, Syn. Fl. Suppl. 430.

5. S. HARKNESSII. Rough-hirsute, 3–6 inches high, parted from the base into a few erect or ascending, equal branches: lower leaves linear-spatulate, two inches or more in length, the floral small, linear-oblong: inflorescence glomerate, becoming racemose here and there: nutlets a line and a quarter long, granulate-roughened, carinate on the back and with distinct indications of transverse rugæ.

Near Mono Lake, in the Sierra Nevada, June, 1886, Dr. H. W. Harkness. A species quite like *S. hispida* in its whole aspect, but with the nutlets of *S. Kingii*, except that they are interruptedly rugose like those of the Amsinckias. The soft carunculer scar is here continued up nearly the whole length of the ventral keel, forming a kind of crest upon it. The corolla is as large as in *S. Kingii*, hence quite showy for so small a plant of this alliance.

THE SPECIES OF ZAUSCHNERIA.

When I look at the strongly marked forms of this genus, as they exist in our herbaria—some of them nearly glabrous, others heavily villous, some of them hoary with a coarse tomentum, others fairly white with a pubescence so minute as

to appear like a mere bloom, some with veinless, others with strongly feather-veined leaves, the margins of which are, in this form entire, in that sharply toothed—I wonder whether authors, in allowing but one species of *Zauschneria*, have not been dazzled and then misled by the large, brilliant fuchsia-like corollas of these plants ; for it is evident they must have been looking to the corollas for specific characters, just as if the genus were an ally of *Fuchsia*, rather than of *Epilobium*. It is altogether unscientific to assume that where flowers are large they must, for that reason, furnish characters, and that only where they are minute one may safely leave them and betake himself to pubescence and foliage for the marks of species. In a word, *Zauschneria* is very intimately related to that principal part of *Epilobium* in which, in generally admitted species by the dozen if not by the score, the corollas present no characters whatever, are never mentioned in describing the plants specifically, and all is rested upon pubescence, taken along with the insertion, venation and toothing of the leaves ; save that now and then a good seed character presents itself.

By the selfsame principles upon which so very many of the forms of *Epilobium* have been named and acceptably defined as species, we may hope that in course of time something like order may be brought forth from this confused assemblage of quite different looking plants hitherto known as *Zauschneria Californica*. The present effort must not be reckoned upon as more than tentative. There is much, doubtless, still to be learned concerning the forms. Our collections are too scanty, considering the vastness of the territory which they occupy. Collectors have neglected them, as collectors will always neglect when they have been told that all they meet with are mere forms of one species. Our ample, characteristic and beautiful genus *Eschscholtzia* suffered too long by the same neglect from the same cause.

Before passing to the formal presentation of my conception of *Zauschneria* as known to-day, I would say that the flowers are not by any means just alike in all the forms. The dif-

ferences in the shape of the calyx-tube, in its length in proportion to the segments, and again in the length of the petals as compared with the calyx-segments are very considerable; and this without saying that filaments are in some plants long-exserted, in others quite included. Still, the floral characters are, as we should expect in this strictly epilobioid alliance, neither obvious nor of any great significancy when compared with those taken from foliage and pubescence.

The flower is not faithfully represented in the original figure in the Reliquiæ Hænkeanæ; for the segments of the calyx are always erect or nearly so, never reflexed as therein exhibited: and while noting this error I may add that no author appears to have mentioned that the corolla in this genus is not quite regular. The petals are, indeed, all of one size and form in the same species, but the two upper stand erect at a right angle with the calyx, while the lower pair are simply parallel with it: so that the fully expanded flower is a little bilabiate, as it were.

The Zauschnerias are not, as they have always been described, suffrutescent. Their stems are, it is true, very hard and brittle, and what with their outer bark at length loosened and disposed to hang in shreds, they are very ligneous-looking in the field as well as in the dried specimen. But the stems of many even annual Onagraceæ of Pacific America have the same strong induration, attended with a partial shedding of the fibrous epidermis, which these perennials display.

* *Leaves feather-veined: plants a foot high, or less.*

1. Z. LATIFOLIA. Decumbent and branching from the base, more or less villous, but not tomentose, sometimes nearly glabrous: leaves thin, ovate to obovate and oblong, acute, prominently toothed: petals as long as the calyx-tube which is narrowly cylindrical for two lines above the globose base, thence widening abruptly into a funnelform throat: stamens much exserted: capsule subsessile, glabrous.—*Z. Californica.*

Watson, Bot. Cal. i. 218 in part, not of Presl. ; *Z. Californica*, var. *latifolia*, Hook. Bot. Mag. t. 4493.

Species of the widest geographical range, being found from the eastern base of Mt. Diablo, in Western California, to the higher Sierra Nevada, where it is common, thence eastward to Wyoming and southward to the borders of Mexico, and probably even throughout the Mexican cordillera, unless the *Z. Mexicana* Presl., which Hænke appears to have obtained between Acapulco and the City of Mexico, be a distinct species. The plant of the mountains of Southeastern Arizona, which is likely to be found far down in Mexico, has narrower leaves, and a much smaller bulb at base of the calyx than in the Californian and typical *Z. latifolia ;* but the leaves are thin and have the many secondary veins which distinguish the species. The present plant occupies a phyto-geographical region quite distinct from the habitat of *Z. Californica*, which is found only from Santa Cruz southward near the sea ; but in the high mountains of the eastern part of Santa Barbara County Mr. Spence collected *Z. latifolia*, which is otherwise unknown to us from the southern part of this State. A peculiar plant, growing nearly prostrate in broad patches, almost glabrous, with lanceolate, thin leaves scarcely veiny, which I found on the remote island of San Miguel, I refer here as a mere form ; but it may be distinct. Its small flowers were only beginning to expand at the time of my leaving the island, in the middle of September.

2. Z. TOMENTELLA. Smaller than the last, grayish throughout, even to the calyx and capsules, with a short, rough, somewhat tomentose pubescence : leaves thick, ovate to lanceolate, acute, entire or toothed : secondary veins distinct, but in two or three pairs only : petals only half as long as the narrow calyx-tube which is gradually widened from the globose base : stamens little exserted : the tomentose capsules sessile : seeds almost pyriform : (elavate-oblong in all other species).

We have but two sheets of specimens of this : one ticketed "Yosemite," the other without any mark to indicate the deri-

vation of the plants. Species with a peculiarly strict, virgate-elongated inflorescence, and a good seed character. The pubescence that of the third species.

** * Leaves with no trace of feather-veins: plants 2—5 feet high.*

3. Z. CALIFORNICA, Presl. Erect from the base and not branching: pubescence tomentose, less dense than in the last, and with some hirsute hairs: leaves linear or linear-lanceolate, entire or denticulate toward the apex: petals exceeding the calyx-segments, stamens little exserted: capsule nearly glabrous, distinctly pedicelled.—Rel. Hænk. ii. 28. t. 52: *Z. Californica*, var. *microphylla*, Gray in Bot. Cal. l. c. ?

Habitat as indicated under No. 1. There is every reason for thinking that the plant of the southern part of California, which Dr. Gray had named var. *microphylla*, is the typical *Z. Californica*. Both the character gives and the habitat point to that conclusion; and since at Cambridge they have always called the more common and widely dispersed *Z. latifolia*, *Z. Californica*, it may have seemed needful to give the very different appearing plant of the southern coast (which is the original plant of Hænke) at least a varietal name.

4. Z. VILLOSA. Very erect, 3—5 feet high, with straight ascending branches: very villous with white, spreading hairs: leaves linear-lanceolate, apparently somewhat falcate, entire or rarely denticulate, thick, with a prominent midvein, mostly opposite, their axils having short, very leafy branchlets (as in the other species of this group): petals exceeding the segments of the calyx but not half as long as the tube, which is cylindrical next the bulb-like base, thence widening into a long but not broad throat: stamens well exserted: capsules glabrous, pedicellate.

Island of Santa Cruz, August, 1886: very common in the bottoms of canons at the south side of the island: flowers of a

richer deeper red than in the other species, the pubescence very characteristic.

5. Z. CANA. Like the preceding in size, but more branching, the branches although rigid strongly recurved, covered with fascicled leaves: leaves narrowly linear-lanceolate, entire, whitened on both sides by a very minute, appressed tomentum, without other pubescence: flowers slender; petals scarcely exceeding the segments and not a third as long as the tube of the dull red calyx: capsules glabrous, on very slender pedicels 3—5 lines long.

Santa Cruz Island, with the preceding but more abundant; very beautiful on account of its pale, seemingly glaucous, but really white-tomentulose foliage crowded on the gracefully recurved branches; the flowers smaller and duller in color than in any other *Zauschneria*. These two very distinct species border together many miles of dry stream banks, and do not run together. I saw, however, two or three plants which were manifestly of hybrid derivation.

A NEW GENUS OF ASTEROID COMPOSITÆ.

HAZARDIA.

Involucre oblong-oval, its many bracts closely imbricated, of firm texture, with no spreading tips. Heads 20—40-flowered; ray-flowers 5—8, neutral, very short, ligulate or irregularly and somewhat palmately 5-toothed or -lobed, pale yellow, changing to dark brownish purple: disk-flowers perfect, narrowly tubular, 5-toothed, yellow changing to brownish. Appendages of style short-lanceolate, pubescent. Akenes linear-oblong, compressed, few-nerved, pubescent. Pappus of numerous, unequal, rigid, brownish, capillary bristles; those of the abortive ray-akenes little reduced. Stout, tomentose, deciduous shrubs of the islands off the coast of California: heads white-tomentose, numerous, in large cymose

panicles which terminate the branches: flowering season August.—*Diplostephium* § *Aplostephium*, Gray, Proc. Am. Acad. xi. 75: species of *Corethrogyne*, Greene, and differing from that genus mainly by its habit, the paucity, reduced size, and different color of its ray-corollas, and the absence of those tufted hairs which adorn the style-tips of *Corethrogyne*. The name will signalize the eminent services rendered to Californian insular botany by Mr. Barclay Hazard, of Santa Barbara, the discoverer of *Lyonothamnus asplenifolius*, and our ready and generous helper in the matter of those fuller explorations of several of the Santa Barbara group of islands which have recently been made.

1. H. CANA. Leaves of thin texture, 3–4 inches long, spatulate-oblong, tapering to a short, winged petiole, very entire.—*Diplostephium canum*, Gray, l. c.: *Corethrogyne cana*, Greene. Bull. Cal. Acad. i. 223.

This species belongs to Guadalupe Island, having been discovered there by Dr. Palmer in 1875. During my own brief sojourn there two years ago, I could find but a single specimen, and that was growing in a niche, some twenty feet above the base of a perpendicular cliff near the summit of the island. It was thus quite out of my reach. On the day before our departure I availed myself of the services of a Lower Californian Indian who, by throwing stones at the bush, brought down two or three leafy branches together with some dead involucres of the preceding season. All these precious fragments I still hold in possession, not doubting that the shrub that bore them, if still surviving, is the only one extant of its species. This shrub must have been about six feet in height, and seemed to be in the decline of old age.

2. H. DETONSA. Leaves of firm texture, 3–5 inches long, obovate-oblong, coarsely serrate toothed, the upper surface of the older partly divested of that white tomentum which covers all other parts of the plant.—*Corethrogyne detonsa*, Greene. Bull. Torr. Club. x. 41: Gray, Syn. Fl. i. part 2. 170.

Very common on all precipitous rocky places of Santa Cruz Island, from the low cliffs that overhang the sea, to the highest summits; most abundant, however, on the northward slope: never inhabiting fair ground where there is a depth of earth, but everywhere springing out of the rock crevices, its stout woody stems clustered and assurgent. Strictly congeneric with the preceding species, usually 3—4 feet high: heads in large ample panicles at the ends of the crowded-leafy branches of the year's growth. It being in flower during the whole of my stay on the island, I had the best possible opportunity of studying its floral characteristics, reaching this conclusion, that we have here a generic type about as well defined as genera average in this difficult tribe of Compositæ.

3. H. SERRATA. Taller, more slender and less tomentose than the last; annual growth of branch longer and leaves less crowded: leaves $1\frac{1}{2}-2$ inches long, obovate, narrowed to a somewhat auriculate-clasping base, coarsely and sharply serrate, of coriaceous texture, in age glabrate on both surfaces: inflorescence cymose-paniculate: corollas of a deeper yellow, style-tips more exserted and more hairy than in *H. detonsa*.

Not yet obtained and perhaps never to be acquired from its proper habitat, a small but high, almost columnar island rock within a stone's cast of the middle-southern shore of the island of Santa Cruz. Here described from branches taken from two bushes (all that were there) found growing on the precipitous side of the main island just opposite the islet whose towering summit seemed covered with it!

Quite distinct from the preceding, yet retaining every generical mark and appearance.

NEW SPECIES, MAINLY CALIFORNIAN.

CARDAMINE FILIFOLIA. Annual, slender, a foot or less in height, branching above, glabrous and somewhat glaucous: leaves pinnately divided into 5 or 6 pairs of linear-filiform

segments of a half-inch in length : raceme loose, 5—10-flowered ; petals 2½ lines long, the limb obovate, truncate or retuse, lilac, marked with pinnate veins of deeper color : pod slender, ascending, an inch long, less than a half-line wide, not beaked, cells 12—15-seeded.

Description from cultivated specimens : seed collected in 1886, on Santa Cruz Island, where the plant may be common, and is to be sought in shady places on the northward slope : allied to *C. oligosperma* of the mainland, but very distinct ; the flowers quite as showy as in some perennial species of the genus.

THYSANOCARPUS CONCHULIFERUS, Greene, Bull. Torr. Club. xiii. 218. Glabrous and glaucous, 3—10 inches high, rather stout and branching : uppermost leaves remotely toothed, the middle and lower as remotely linear-lobed (the lobes straight and divaricate), all except the lowest auriculate-clasping : racemes short and dense : petals spatulate-oblong, nearly a line and a half long, light purple : samara a line and a half long, cymbiform, the somewhat conduplicate margin parted into spatulate lobes, or these coherent above, leaving narrowly oblong perforations : style a half-line long beyond the margin of the fruit : pedicels a half-inch long, firm but recurved.

This most interesting insular species was described, in the place referred to, from some fruits gathered out of the rock crevices where the plant grows, supplemented by the dead and almost leafless stems. A cultivated specimen enables me to amend and finish the description. The flowers are very large for the genus.

RIBES MARSHALLII. Glabrous, the branches armed with stout, but rather short, triple spines : leaves roundish, 5-lobed, the lobes incised : pedunceles 1-flowered : flower pendulous, an inch long ; calyx-segments elongated-oblong, spreading or recurved, dark purple ; petals 2—3 lines long, spatulate-oblong, salmon-color : filaments slender, more than ½-inch

long; anthers very small, $\frac{3}{4}$-line long, oblong, obtuse at both ends; ovary bristly.

Summit of Trinity Mountains, California, July, 1886, found near lingering snow-drifts, by Mr. C. C. Marshall. This gooseberry is in some sense intermediate between *R. Menziesii* and *R. Lobbii*, and the flowers are remarkably large and handsome, even surpassing those of *R. speciosum* in all save brilliancy of color.

MITELLA DIVERSIFOLIA. Leaves all radical, ovate to orbicular, with 3—5 somewhat irregular, shallow but angular lobes, these entire, and the whole margin somewhat ciliolate, the base cordate, with nearly closed sinus: scape a foot high, indistinctly unilateral: calyx-lobes white and petaloid although minute: petals white, cuneate-oblanceolate, palmately trifid at the abruptly widened apex: stamens 5.

From the same region as the preceding, and by the same collector.

M. OVALIS. Leaves all radical, 2 inches long, oval or oblong, obtuse, cordate at base, with closed sinus, the margin with shallow rounded lobes and mucronulate teeth, the upper surface with scattered, rather coarse whitish curved hairs: petioles ferruginous-hirsute with deflexed hairs: scape a foot high, glabrous or nearly so; pedicels very short: calyx-lobes short and broad, not whitened: petals green, pinnately parted at apex into 3—5 linear lobes: stamens 5.

Collected in Mendocino County, California, many years ago by Mr. Bolander, and ticketed "*M. trifida*," but that species has petals of a very different character, much more like those of the new one above described, being white, and palmately trifid. In *H. ovalis* the foliage is of a firm texture, more like those of a *Heuchera* in this respect, than they are in other species of *Mitella*.

GODETIA MICROPETALA. Near *G. purpurea* but more slender, 1—3 feet high, puberulent, the ovaries villous: leaves an

inch long, narrowly lanceolate, entire, sessile: spike strict, either open or congested: calyx-tube less than 2 lines long, segments 4 lines, their slender elongated tips twisted in the bud: petals linear-lanceolate, only 3 lines long, barely a line wide, entire or irregularly toothed: capsule linear-oblong, $\frac{3}{4}$-inch long, sessile, the apex abruptly pointed, hirsute, the alternate angles 2-costate.

Hills along Walnut Creek, at the western base of Mt. Diablo, May, 1886. An odd species, simulating *Clarkia* in the character of its petals. In aspect it is so unlike *C. purpurea* as to preclude the supposition of its being a deformed state of that species.

ASTRAGALUS MIGUELENSIS. Perennial, a foot or two high, white with a dense tomentum: leaflets in 9—12 pairs, 5—9 lines long, obovate or elliptical, obtuse or retuse: stipules broad, acute, connate opposite the petiole: flowering spike an inch long, on a peduncle of three inches: tube of the calyx 2 lines long, the broadly subulate teeth a line: corolla 6—7 lines, cream colored: pod inflated, coriaceous, 1—$1\frac{1}{2}$ inches long, more than half as broad, obcompressed, acuminate or abruptly acute, usually purplish, more or less tomentose-pubescent, neither suture intruded.

Near *A. anemophilus* of Cape San Quentin, but with larger flowers and legumes, the latter differing in form as well as in size. The plant of Lower California is evidently *Phaca restita*, Benth. Bot. Sulph. 13; but it will retain the specific name *anemophilus*, there being an Old World *Astragalus vestitus* of Boissier.

ASTRAGALUS LEUCOPSIS, Torr. & Gray, var. BRACHYPUS. Less than a foot high, nearly glabrous: pod rather shorter and broader than in the type, its stipe barely equalling the calyx.

Island of San Miguel: quite common, particularly on the southern and eastern parts of the island. The typical form inhabits the corresponding districts of Santa Cruz.

Issued March 1, 1887.

GALIUM FLACCIDUM. Perennial, herbaceous, hirsute-pubescent, the weak reclining stems a foot long: leaves in fours, a half-inch long, narrowly oblong, obtuse or acutish, very thin, 1-nerved: peduncles slender, 4-bracted below the solitary greenish flower: ovary villous: fruit unknown.

Shady woods on the north side of Santa Cruz Island, not common: resembling *G. Californicum*, but doubtless a dry-fruited species allied to the Mexican *G. uncinulatum*.

GALIUM MIGUELENSE. Suffrutescent, evergreen, the prostrate stems 6—18 inches long, whole plant covered with a sparse retrorse pubescence: leaves oval, acute, $1\frac{1}{2}$ - $2\frac{1}{2}$ lines long, dark green, coriaceous, in age deflexed and almost imbricated on the branches: berry large, glabrous, pearl-white: **flowers not seen.**

Island of San Miguel: a single large matted plant on a grassy slope above the western shore of Cuyler's Harbor. Greatly resembling the South American *G. Relbun*; but that has a different pubescence and red berries.

CALAIS PLURISETA. Glabrous: proper stem 2—4 inches high; scapose peduncles 8—10 inches: leaves very narrowly oblanceolate and apparently quite entire, at most only denticulate: akenes $2\frac{1}{2}$ lines long; pappus paleæ persistent, linear-lanceolate, $1\frac{1}{2}$ lines long, scarcely notched, the very slender awn $2\frac{1}{2}$ lines, subtended by a secondary awnlet on either side, one of these frequently one-third or one-half as long as the primary, the other shorter, or both nearly obsolete.

Island of Santa Cruz, 1886. The species apparently abundant; the plants all dead and the foliage rather imperfectly preserved; but the akenes, exhibiting well the characters of a very striking new species, were gathered in abundance from their lurking places, the cracks in the dry, sun-burnt soil.

[ARCTOSTAPHYLOS, MYRTIFOLIA, Parry. (§ MICROCOCCUS). Shrub 1—3 feet high, widely branched from the base, with shreddy bark, becoming smooth with age; leaves entire,

ovate, 4—10 lines in length, 3—4 lines wide, acute at both ends or occasionally obtuse at the summit, with a thickened cartilaginous margin frequently prolonged into a cuspidate tip, more or less distinctly net-veined, smooth on both sides, or when young with a scattered glandular scurf and hispid-ciliate margins, petioles short, together with the young branches thickly set with intermixed hispid and glandular hairs; inflorescence short-racemose, with broad triangular bracts attenuate above; pedicels short with conspicuous hyaline bracteoles at base; calyx 5-parted with broad scarious margins, persistent; corolla oblong-ovate slightly urceolate, with 5 short lobes; stamens 10, filaments hairy on the upper part of the expanded portion; style smooth, sulcate, with green stigmas; ovary hispid hairy becoming smooth; fruit (immature) with thin wrinkled pericarp, readily deciduous; akenes apparently resembling those of *A. nummularia* with **thin walls, and large embryo.**

A low densely branched shrub, with small myrtle shaped leaves, growing in extensive moorish patches, on the summit and slopes of gravelly ridges east of Ione, Amador County, California. Closely allied to *A. nummularia*, Gray, of Mendocino and Santa Cruz coast plains, from which it is clearly distinguished by its sharp pointed leaves, acute also at base. the floral segments regular in 5, with 10, stamens. The mature fruit (not yet seen) is likely to conform closely to that of *A. nummularia* as noted in Davenport Acad. Proc. Vol. iv. p. 36.

First collected in leaf and undeveloped flower buds by Mrs. M. K. Curran, May, 1886, and by the writer in full flower, with forming fruit, February 1st, 1887, at the above noted locality. C. C. Parry.]

Phacelia (Euphacelia) scabrella. Annual, procumbent or prostrate, the numerous branches 2 feet long, somewhat scabrous throughout, the inflorescence setose-hispid with short, bristly hairs: leaves pinnately divided, the segments with rounded and few-toothed lobes: lobes of the calyx oblong.

obtuse, somewhat unequal, ¼-inch long: corolla pale purple, rotate-campanulate, 2—4 lines broad: stamens exserted: seeds oval, lightly favose-pitted.

Island of San Miguel; abundant on grassy slopes of the northeast side.

Diplacus parviflorus. Rigidly shrubby, but flowering at from 3 inches to 2 feet high; glabrous and glutinous: leaves narrowly ovate or rhombic-ovate, coarsely serrate-toothed: corolla an inch long, brick-red, nearly tubular, the small, entire, quadrate lobes very little spreading: stamens exserted.

North side of the island of Santa Cruz, abundant on open rocky slopes, flowering profusely at a height of only three or four inches, yet not at all herbaceous. Even when, in shady places and better soil, it attains the height of two feet or more, the leaves and flowers retain all their characters, thus forbidding its being dealt with as a variety of *D. puniceus*.

Euxanus Austinæ. Near *E. mephiticus*, but scentless and scarcely viscid, appearing glabrous (glandular-puberulent under a strong lens), 1—3 inches high, much branched from the base: leaves spatulate, a half-inch long or more, entire, with 3–5 parallel veins: calyx-teeth subequal, triangular, acute: corolla yellow, the throat purple-dotted, tube elongated and slender, limb broad and irregular: capsule attenuate at apex, greatly surpassing the calyx.

Modoc County, 1885, Mrs. R. M. Austin.

Euxanus Cusickii. A span to a foot high, simple or branched from the base; leaves broadly ovate, very acute, entire, sessile, an inch or more long and nearly as broad: calyx-teeth very unequal, triangular-subulate, the very acute tips somewhat recurved: corolla bright red-purple, tube slender, limb rotate and quite regularly lobed, 6—10 lines in diameter: capsule not seen.—*Mimulus Bigelovii*, var. *ovatus*, Gray, Syn. Fl. Suppl. 445, in part at least.

Oregon and Washington Territory: collected by Cusick

and by Howell. The species a most beautiful one, lacking the villous pubescence of *E. Bigelorii* and otherwise different.

EUNANUS SUBSECUNDUS. —*Mimulus subsecundus*, Gray, l. c. Apparently common near Antioch, where it was again collected in 1886 by Mrs. Curran.

MIMULUS ARVENSIS. Annual, erect, slender and simple, 1—2½ feet high, stem more or less quadrangular, sparingly leafy, loosely racemose from the middle: lower leaves on long petioles, roundish, coarsely toothed and hastate, or the petioles bearing many accessory leaflets, the leaf thus becoming lyrate; floral leaves soft-white-villous beneath, all other parts of the plant glabrous: pedicels an inch or two long, slender and ascending: calyx campanulate, 3—4 lines long, purple-dotted, the orifice scarcely lobed, in fruit twice as large, short-cylindrical, almost truncate at base as well as orifice: capsule nearly orbicular, compressed, 2—3 lines long: seeds brownish, nearly smooth.

This plant was first known to me in a specimen or two brought from Lake County in 1884, by Mrs. Curran. I have mentioned it on page 112 of the first volume of California Academy Bulletins, under *M. microphyllus*. In the spring of 1886 I was surprised to find it common in wheat fields among the growing grain, in both San Mateo and Marin counties, not far from San Francisco. It is strictly annual and very unlike the common *M. guttatus* to which, under the name of *M. luteus*, a large number of our species and subspecies were until recently referred. In the districts named the large perennial will be met with in the same field with the annual, if a streamlet or springy place exist; and this not rarely 5 feet high, bearing a truly magnificent panicle of racemes, sometimes the whole cluster nearly 2 feet long, and half as broad: and the annual here defined will be in seed and dying while its neighbor of the streamlets is not yet in full flower toward the end of April. I should have been happily instructed if

Dr. Gray had told us, while he had the Benthamian specimens of *Mimulus* before him, just what *M. lyratus* is and where it came from. According to what I infer to be its leaf character *M. arvensis* might be that; but I have no access to the original description, and the name, from the remote times of the tenth volume of the Prodromus down to the Synoptical Flora, I find only amid the uncertainties of the synonymy.

CASTILLEIA HOLOLEUCA. Shrubby, 3—5 feet high, white with a dense flocose tomentum: branches slender, leafy, with axillary leafy branchlets: leaves linear, entire, 1—2 inches long, less than a line wide: spike 2—4 inches, short-pedunculed; bracts linear-spatulate, entire, or the uppermost 3-cleft, their tips cream-colored: calyx 8 lines long, deeply cleft on the upper side, merely lobed on the lower: galea of the corolla shorter than the tube, exserted, straight.

Islands of Santa Cruz and San Miguel, 1886.

SPHACELE FRAGRANS. Shrub 6 feet high: leaves ovate-oblong, obtuse, coarsely and irregularly dentate, hastate at base, 2—4 inches long, of thin texture, loosely white-woolly beneath, glabrate above, not resinous, agreeably aromatic: calyx open-campanulate, more than an inch long, its lobes triangular-lanceolate, as long as the tube: nutlets large, glabrous: **corolla not seen.**

In canons of the south side of Santa Cruz Island, 1886. *S. calycina* has a resinous-viscid, ill-scented leaf with crenate margin and rounded base, calyx-lobes triangular-acute and only half as long as the tube, besides nutlets which are glandular-viscid. It can not include this insular shrub, and perhaps not those of the southern part of the State, very imperfectly known, which have been named as varieties of it.

ERIOGONUM GRANDE. Basal shrubby and leafy part a foot or two high with many branches; peduncles 3 - 5 feet, thick and fistulous below, slender and loosely cymose-dichotomous above: leaves ovate-oblong, obtuse, cordate at base, the mar-

gins crisped, 2—3 inches long, on petioles of equal length, lower surface densely white-tomentose, upper glabrate: involucres terminal only: perianth glabrous, white, segments equal, obtuse, rotate-spreading in flower: filaments villous at base.

Interior of Santa Cruz Island, very common; remarkable for the length of its pedumeles, the entire plant, of which these form by far the greater proportion, being commonly 6 feet high. Species near *E. nudum*, but distinguished by its rotate perianth and villous filaments. It will no doubt include the *E. nudum* var. *pauciflorum* of Mr. Lyon's Santa Catalina and San Clemente lists, although I have seen no flowering specimen from either of those islands; but I think the mainland plant to which Mr. Watson gave that name is different, and well enough referred to *E. nudum*.

Eriogonum rubescens. Near the preceding but low, the depressed leafy caudex only a few inches long: leaves ovate-cordate, with crisped margins and both surfaces tomentose or the upper glabrate: peduncle stout, erect, a foot high, bearing at summit a compact cymose cluster of many-flowered umbels: perianth glabrous, rose-red, campanulate: filaments villous at base.

Island of San Miguel, where it is abundant on low sandstone cliffs near the sea: but first found in a similar locality at the extreme west end of Santa Cruz. A most beautiful species.

Eriogonum tripodum. Near *E. sphærocephalum*: leaves linear-spatulate, an inch long including the short petiole, tomentose on both sides, the margins revolute: peduncles slender, more than a foot high, bearing a whorl of leaves above the middle, subtending 3 erect rays of which 2 bear a whorl of small leaves about midway and the other is naked, each with a single involucre at summit: perianth yellow, densely villous, less than 2 lines long, abruptly narrowed to a very short stipe-like base.

Hough's Springs, Lake County, July, 1884, Mrs. Curran. Differing from its near relative of the north in its very small and abruptly narrowed perianth, and slender habit.

ATRIPLEX NODOSA. Annual, stout, less than a foot high, with many divaricately spreading, rigid branches: scurfy-mealy and apparently scabrous: leaves broadly rhomboid: fruit clusters large, borne at the nodose-enlarged forks of the branches: pedicels stout, thickened under the bracts, very unequal, 1—5 lines long: bracts 2 lines long, 3-nerved, 3-lobed at summit and below it covered with irregular, leafy-spongy projections.

A single late autumnal, nearly dead specimen, obtained by Mrs. Curran near Antioch in October, 1885. Near *A. argentea*, but with remarkably swollen joints, and very peculiar fruit clusters and bracts; the latter rendered globose by appendages resembling the thallus of some lichen.

QUERCUS PARVULA. Near *Q. Wislizeni*, only 2—3 feet high: leaves persistent, coriaceous, dark green, 1½—3 inches long, ovate-lanceolate, acute, mostly entire, no veins prominent except the middle one beneath: fructification biennial: acorns (immature) solitary, short-peduncled; cup deep, covered with brown, ovate-oblong, obtuse, ciliolate scales which are appressed-pubescent up and down the middle.

Northward slope of Santa Cruz Island; forming low clumps, chiefly along the borders of the pine woods; not frequent, but a clear new species.

Recent Botanical Literature.

The Cayuga Flora. Part I. A Catalogue of the Phænogamia growing without Cultivation in the Cayuga Lake Basin. By William R. Dudley.

Local plant catalogues, as they run, seldom rise to the dignity of literature. They are commonly mere lists of names, useful to people who make exchange of specimens, but otherwise of little value. The present Catalogue, being volume two of the Bulletin of the Cornell University, is exceptional among catalogues in that it merits a place among real books and very good books of local botany. The author is one who has studied with a zeal and a love, the flora of his district. His five and twenty pages placed under the modest title of an Introduction, constitute what is perhaps the most admirable piece of local botanical history hitherto published in America. From quoting instructive paragraphs out of the Relations of the Jesuit fathers who knew this Cayuga region and wrote about it more than two centuries ago, he passes to the observations of John Bartram, who journeyed to those wilds, as they then were, in 1743; shows that the immortal Peter Kalm from Finland (Abo, or perhaps admissably written Aabo, but not "Aobo") penetrated to the same new field a few years after Bartram: gives long passages from Pursh's Journal, with the original Purshian English all faithfully preserved, relating to the Cayuga Lake country: and all these things reveal a certain literary taste which scientific writers do not always possess.

In the catalogue itself one finds recorded all the particular localities of the less common and rare species still existing, or to be looked for in the region, and more than that, the names, stations, dates and collectors' names, of many species obtained

there in years long past, and which are now extinct. The historic interest of the catalogue is therefore of the highest order in every way.

As regards nomenclature the work is, with some exceptions, well in accordance with the latest standards. But we could have wished to see the name SOLEA CONCOLOR, Gingins, rather than *Ionidium concolor*, Benth. & Hook. With us who are as familiar with *Ionidium* of Western America as with *Solea* of the Atlantic side of the continent, the two genera are not to be confounded. Professor Gray has somewhere given expression to the same opinion, and has signified that *Solea* is to be retained in the Synoptical Flora. Doubtless also in the matter of that shrub early known as *Spiræa opulifolia*, Linn., the editor should have passed by the synonym, *Neillia opulifolia*, Benth. & Hook. and have written PHYSOCARPUS OPULIFOLIUS, Maximowicz. For *Nesæa verticillata*, HBK., an older name, and that by one of our classical American authors, DECODON VERTICILLATUS, Elliott, is judged to be the right one, in the recent scholarly monograph of Lythraceæ, by Dr. Kœhne. Typographical errors in the volume are few, and the treatise does credit not only to the author but to the institution under whose auspices it is given to the public.

Contributions to American Botany. By Asa Gray. *Proc. Am. Acad. xxii.*, pp. 270–314.

For fifteen years and more we have been wont to look forward annually, with eagerness, to the coming of the year's number of these Contributions by Professor Gray. In preparing the present series the celebrated author has gone back to the polypetalous orders which he had, since some years ago, given over to the handling of his learned associate, Mr. Sereno Watson. The first natural order dealt with is that of the Papaveraceæ, in the discussion of which, the most interesting new fact is that which comes in at the end of the whole contribution, as an addendum, namely, a true poppy indigenous to the Santa Inez Mountains in the Southern part of

California. Remarking that his new *Papaver Californicum* is altogether like the Californian *Meconopsis*, except in its pod, the author says that the former may suggest the probable genealogy of the latter. It is almost singular that he does not here mention a still more remarkable and suggestive Papaveraceous discovery made also during the last season, and in almost the same region, by the present writer. I refer to my *Dendromecon flexile*, published in the Bulletin of the Torrey Botanical Club of November, 1886. Of this genus the original, and long the only known species, is a common shrub of the mountainous parts of central and southern California; and Santa Cruz Island, which lies in view from the Santa Inez range, is covered with the very distinct new species, a much larger shrub than *D. rigidum;* while a third species, *D. Harfordii*, of Dr. Kellogg, is said to be equally prevalent on the island of Santa Rosa, which lies closely adjacent to Santa Cruz. Are not these insular shrubs really the most interesting of all American Papaveraceæ, raising a curious question, it may be, of the genealogy of the one mainland species of *Dendromecon?*

The one genus of the order which now receives a formal elaboration at the hands of Professor Gray is *Eschscholtzia*. In the first volume of the Botany of California, now eleven years in print, only two species were admitted. In a paper printed some two years since, in the Bulletin of the California Academy, the number was raised to ten. The present monograph is, in the main, an adoption of the species and the arrangement proposed in that paper of two years ago. The author would partly excuse the errors which had been run into at Cambridge, by saying that they had not known the typical *E. Californica* to be perennial. The late Dr. Engelmann no longer ago than the year 1881 announced in the Botanical Gazette what he took to be a new discovery of his, that the plant has a perennial root. We of California had long known that; and yet there was no call for us to publish the fact; the discoverer and founder of the genus, Chamisso, himself

had known it, and had said so from the first.[1] This kind of error is common with that class of closet botanists who will place no confidence in the statements of men in the field. In describing my *E. Austinæ*, the first thing I have said is that its root is perennial. I suppose that the specimen of it sent to Cambridge chanced to be one of a year old or less, in which the character of the root was not yet become conspicuously, perhaps not at all, apparent; and this aspect of a single dried specimen is, with this author, reason enough for setting aside my statement, and placing the plant along with the annual kinds. But that is not the worst which has befallen this, which I regard as one of my very best species. It is placed as a mere form of an annual whose stems are scapose and quadrangular, while its own are leafy and terete! If the species had to be reduced it could about as easily have been put in with almost any other one of our ten or a dozen as with *E. cæspitosa*. However, by the reduction of *E. Austinæ* and one or two other species more recently proposed, the number recognized by Dr. Gray is nine only: and so the neck is saved, but barely saved, to that criticism which he hastily passed upon my paper shortly after its appearance: "We would not readily believe that the genus *Eschscholtzia* comprises as many as ten definable species."[2] Concerning perennial Eschscholtzias I would here remark that I think we have a third, belonging to the interior of California quite exclusively, hence beyond my frequent observation. It is a very stout and erect plant, with magnificent corollas of a rich orange color throughout. I should have felt like giving it a place in my monograph could I have determined whether or not it is the *E. crocea* of Bentham. The characters of a fourth species of the same root-duration are given in the foot-

[1] See Linnæa, i. 554, published in 1826.

[2] American Journal of Science for 1885, page 321.

note[3]. With the specimens of Bentham before him Dr. Gray has perceived that while the *E. cæspitosa* and *E. tenuifolia* are one species, that which was mistaken for the latter, first by Sir William Hooker and afterwards by myself, is distinct. This raises a question of the propriety of retaining the name *tenuifolia* for the plant now so designated. If kept, the strictest accuracy will require that one write, not simply *E. tenuifolia*, Hook., but *E. tenuifolia*, Hook., Greene, nec Benth., a phrase so cumbersome that one would run all risks of being misunderstood and of confusing people's minds, rather than employ it. Furthermore, since no botanist's eye is all-seeing, or any botanist's judgment infallible, who can assure us that no one will, in the future, find Bentham's *E. cæspitosa* and *E. tenuifolia* to be distinct and the *E. tenuifolia*, Hook. et. al., also a species by itself? It seems to us bad practice to ever knowingly apply to one species a name which has been used to designate another, and that the charitable thing on Dr. Gray's part would have been to give this species in question a new name at once, thus precluding, if he is right in the identification he announces, innumerable possibilities of future complication in the synonymy of the genus.

It was an unenviable task, that of revising our Portulacaceæ, and we of the West, to whose region belong almost all the species (and genera too, if there be any genera), are under special obligations to Dr. Gray for the learning he has

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3. ESCHSCHOLTZIA GLAUCA. Perennial, very glaucous, erect, 2 4 feet high, of a loosely cymose and sometimes distinctly dichotomous inflorescence: leaves small, their segments linear and little divergent: torus with a narrow but manifest spreading rim: petals an inch long, with orange spot at base and commonly a narrow border of the same color at the truncate summit, otherwise light yellow: seeds globular, reticulated: cotyledons linear, cleft to the middle.

On dry clayey hillsides of the interior basin of Santa Cruz Island. Near *E. Californica* and best distinguished from it by the peculiar glaucous whiteness of the herbage, and by the profusion and the cymose arrangement of its flowers. The red margin of the corollas, if it were broad enough to be conspicuous, would make this plant a great desideratum with cultivators.

lavished on them in this paper. As regards *Montia* and *Claytonia*, the abundant concurrence of both, in a vast number of forms, on the Pacific Coast, renders this the only natural field for the study of them. We abandoned some years ago all hope of really distinguishing the two genera. No better distinction can be drawn than that subsisting between scapose, and leafy-branched herbs; a character which imparts a difference in aspect, but can not, even in *Portulacaceæ*, be accepted as of generic value. Yet this, if stood by, would throw into *Montia* the section *Montiastrum* of *Claytonia*, one of the species of which Mr. Watson, as it appears by Dr. Gray, actually and very naturally, named as a *Montia*. The total failure of the original character of three stamens and unequal somewhat united petals, is tacitly admitted in the revision; and that is equivalent to giving up *Claytonia*, which will nevertheless, be retained; but out of a mere delicacy of feeling (with which we are in full sympathy), for the name of our American Clayton so long connected with that charming early vernal flower of the Atlantic slope, than from any strictly phytographical consideration.

If it is purposed to keep *Spraguea* in the rank of a genus, it will need a less dubious support in the Synoptical Flora than has been brought to it in this preliminary paper, where the only remark pertaining to it, as a genus, is this: "I think that *Spraguea* should still be retained upon the assigned characters." After reading this, one naturally goes back a few pages, to the conspectus of genera, desirous of learning what characters can possibly have been assigned: and behold, *Spraguea* is not so much as named there; but *Calyptridium* is so defined as plainly to include it. The most generous construction which can be put upon all this is, that our author when he had finished his conspectus of the genera was of the opinion that *Spraguea* is no genus, and that later he somewhat uncertainly took, or was inclined to take, a different view of the matter, and said so, without troubling himself to go back and make his paper, as a whole, coherent upon the subject. There was perhaps no connection, in the writer's mind, between the sen-

tence above quoted and the essentially personal one immediately preceding it. I quote again: "Mr. Watson has indicated (in Proc. Am. Acad. xx. 356) the near approach which one species of *Calyptridium* makes to this otherwise peculiar genus; and Professor Greene has consequently united the genera." It would not appear to be of much importance, scientifically considered, whether Professor Greene is or is not accustomed to wait, on his side the continent, for hints to come from the opposite shore, as to whither among his western hills he may go and find a weak genus to suppress, or an unrecognized one to raise up. He does not deem an elaborate defense of himself in this case worth making. I should have passed this by in silence, I think, if Professor Gray had been as careful to tell his readers where my remarks on *Spraguea*[4] were to be seen as he was to indicate where the hints had been given of which, he says, my action in the matter was a consequence. Really, that which broke the back of *Spraguea* is a certain rare plant which Mr. Watson has never mentioned, if indeed he has ever examined it, and which, it is evident, Professor Gray has not yet looked into with that careful scrutiny which some of us have deemed it worthy of. Of this plant, *Calyptridium paniculatum*, he now says he can make nothing but a casual variation of "*Spraguea umbellata*." It needs no more than a casual glance to discover the difference between a paniculate and an umbellate inflorescence; and that is something. But the zealous lady to whom the botanical world is indebted, not only for the rediscovery of the rare plant in question, but also for all the good specimens of it now extant in herbaria, indicates (in Bull. Cal. Acad. i. 182) some marks of its flowers and seeds which would show it to be fortified as a species by a strength of character quite unusual in the order. What difference could be more decisive than that between a reniform and an oval seed? I am not saying that I have examined the plant and verified these things. I would only call attention to the fact that such statements have been made,

[4] Bulletin Torr. Club. xiii. 143.

and that, in the treatise under discussion, they are not alluded to. It may be the author has not read them ; but his silence is not always so to be construed where it is a question of work done in California by resident botanists.

Some eighteen pages of these Contributions are occupied with an elaborate study of our Malvaceæ, an order in which no other living author is so well at home as Professor Gray, and in which his is the honor of having founded, almost forty years ago, two of our principal genera, *Sidalcea* and *Malvastrum*. A new one, *Horsfordia*, of two species, is now proposed. It is a family of plants in which the present writer has done but little critical work ; outside of *Sidalcea* nothing at all ; he is therefore only to derive instruction, as occasion may offer, from these inviting pages.

The proposed new order of Cheiranthodendreæ will be a very small order with a very large name ; for the genera are only two, each of a single species. In the matter of the ordinal name there was, however, hardly room for a choice, and so no complaint can be made.

Under the heading of *Miscellanea* the number of new species is small as compared with that of former years, there being only eight or nine of them ; and the very first one we are seriously apprehensive will be but a synonym of *Anemone Grayi*, Behr & Kellogg, Bull. Cal. Acad. i. 5, which we all smiled about at first, which Dr. Gray promptly passed adverse sentence on, but which the present writer has since felt forced to accept as a good species and accord a place in his manuscript of the Handbook of the Botany of Western North America. Even on Mt. Tamalpais, in sight of San Francisco, the flowers are bluish often, and the transition as regards color, is no doubt gradual between the form in this locality and that of the more remote north where the flowers are sometimes of so beautiful a blue. But the author of *A. Oregana* has now, as usual in such cases, observed strict silence regarding this at least possible species which, in spite of its Californian authorship may yet, as I have intimated, fairly reduce to a synonym the name *A. Oregana*. The named

variety of *Franseria camphorata*, Greene, described new from Lower Californian specimens, will be the plant, which is common on Cedros Island, where I collected it in 1885. Mention is made of it, as a form, in the note appended to my description of the type.

The interesting and instructive remarks on *Solidago erecta*, *Galeosia juncea* and many more species, are of that class which impart to all such papers of Professor Gray a value which none but critical students can fully appreciate. Enriched as they are by the ripest erudition of the most eminent of New World botanists, they will not depreciate with the appearing of that wished for volume of Synoptical Flora to which the author calls them precursory; for the learning that is stored in them can not re-appear in full upon the pages of the book itself. It is this characteristic of the whole long succession of these Contributions by Professor Gray, which will render the volumes of Proceedings of the American Academy a treasury of North American botany through all the years to come.

Wherefore Pittonia?

The foregoing pages, issued some months ago, have elicited enquiry as to the meaning and purpose of Pittonia.

Although we gave them forth in a form which implied that other pages were to follow, we had no idea that we were initiating what would be called a Journal, or be thought worthy of mention in connection with such important publications as Linnæa and Adansonia. Therefore our friends of the editorial staff of the Torrey Bulletin and the renowned botanical editor of the American Journal of Science have done Pittonia honors little merited and wholly unexpected.

The succession of papers which we hope to continue under this title will have more or less to do with the genera and species of plants and their nomenclature. They will therefore be quoted. For convenience of citation they must needs have some general name; and the same necessity which calls for a name suggests the desirability of its being a short and easy one. Pittonia as a mere name will answer all these purposes as well as Linnæa, Grevillea, Adansonia and others have done; and it will also call to mind, as each of those does, an eminent botanist. Professor Gray could readily perceive that it comes from the family name of Tournefort, an author who is commemorated in our present generical nomenclature by the name *Tournefortia*. That is the Linnæan name of the genus dedicated to the great French botanist of almost two centuries ago. It is a longer and less euphonious name than Pittonia; and besides that, the very same genus which adorns the memory of Tournefort was originally named *Pittonia* by that very learned contemporary of Tournefort and eminent botanist, the Reverend Father Charles Plumier. This was done in the year 1703, four years before Linné was born

Issued July 1, 1887.

Thirty-four years later the rising Swedish authority arbitrarily set the then old and well established name *Pittonia*, and put his own new and more cumbrous *Tournefortia* in its place.

So then, the name that heads these pages is not newly coined; is far from being an original conception of the present writer. And all this is well known to the few of our botanists who do not ignore the fact that there existed a botanical nomenclature before Linné.

The name Pittonia as here employed may do double duty as commemorative of two great pre-Linnæan botanists, the immortal Joseph Pitton of Tournefort and his illustrious colleague, Father Plumier, whose immense labors and whose valuable publications were chiefly upon the botany of tropical America.

A Curious Collinsia.

I was lately crossing the Coast Mountains at a point some twenty-five or thirty miles south of San Francisco, my route being the county road between the villages of San Mateo and Spanish Town, or Half Moon Bay. On the eastward slope, not far below the crystal springs reservoir, the road for some distance had lately been widened by the digging away of several feet more of the mountain slope on one side and depositing it below on the opposite side. This improvement I judge must have been made at some time within the last year.

On the new embankment, which had thus been formed of soft disintegrating rock and reddish clay, some common plants were growing in more than ordinary luxuriance, this newly overturned earth being, as I suppose, especially well suited to the species which had thus early taken possession of it; and the first among them which drew my notice particularly was a *Gilia*, one of the doubtful forms, or perhaps undescribed species belonging to the *multicaulis* group. Among its scat-

tered pale blue flowers I was observing that not a few, indeed nearly all of the truly terminal ones were hexamerous, having a corolla-lobe and a stamen too many. Stopping to observe these not altogether insignificant anomalies, a smaller plant with larger flowers caught my eye, a plant which I might atherwise have missed, and one which proved itself a greater wonder. At the distance of a couple of rods I thought it a small full blown specimen of *Gilia densiflora*, and should have passed it by for that but that at a second glance I seemed to note a slight irregularity in the corollas. Clambering down close to it I saw, first of all that, of whatever species, it was a stunted individual the top of which had been eaten off by some grazing animal, and that the mere stub which was left was crowded with flowers. I then discovered to my amazement that the plant which bore these exceedingly gilia-like corollas was *Collinsia bicolor*.

Before proceeding to describe these anomalies I must speak of that normal form of which they are but a casual variation. The corollas of the collinsias are, as a rule, strongly bilabiate, the limb consisting of two lips, the upper an erect and plane two-lobed lamina, the lower a considerably different three-lobed one. In the lower, the lateral lobes are plane and spreading, and, as regards the upper lip, exactly divaricate, while the middle one of the three is closely folded upon itself into a narrow keel which encloses the stamens and lies concealed beneath and behind the two broad and showy lateral ones, in this respect imitating the papilionaceous corollas of some Leguminosæ. Indeed, beginners in botany are apt to mistake the first collinsia corolla they see for that of a leguminous plant, being deceived by this rather striking imitation. It is in reality a corolla of quite extreme irregularity between the bilabiate and the personate types.

In the specimen under consideration there were some thirty well expanded corollas. In about twenty of them there was a manifest deviation from strict regularity, but only in this, that

the two lobes of the upper lip were rather smaller than the three forming the lower. Those of the lower were all just alike, that is to say, the middle one which in its normal state lies conduplicate and keel-like back of and below the other two, closely enfolding the stamens, was plane like the rest, all three being of one size, form and color, and the stamens being left free to assume the place which they are wont to hold in regular flowers, in immediate contiguity to the pistil. But more than this; between each of the three sinuses of this lower lip and the closed throat of the corolla there lay a narrow but conspicuous fold, very like that which one sees in *Myosotis* and some other genera of Asperifoliæ. The other nine or ten corollas were perfectly regular, there being no difference at all, of size, form or attitude, between the five segments of each flower, the limb as a whole being almost rotate, and the folds were five also. The color in all was a mere lavender, deepening into purplish at the very tips of the segments; for this species of Collinsia is variable in color, the shades as often very light and nearly white as they are darker.

I suppose that if one of these perfectly regular corollas had been brought to me for identification, and only the corolla with its adherent stamens, I should not have referred it even to the natural order of Scrophularineæ, much less to the genus *Collinsia*. But I might have thought it to belong to some genus of Hydrophyllaceæ or Polemoniaceæ with which I had no acquaintance; or, remembering the peculiar folds in the throat of certain gilia flowers, I might have taken it for a new, but very anomalous species of that genus. However, if in the supposed case, the corolla had been one of the less regular of the two kinds which this plant bore, I think I could not have hesitated long as to the order; for these corollas are fairly those of Nuttall's genus *Tonella* which Mr. Bentham early reduced to *Collinsia* but afterwards restored, apparently in deference to the opinion of Professor Gray.

The retention of *Tonella* as a genus has been a manifest

inconsistency, at least since among the many modern and unequivocal new accessions to the closely related genus *Pentstemon* there are some species with very eccentrically bilabiate corollas and others with perfectly regular ones. But now since a collinsia of the bilabiate type can sportively array itself partly in tonella blossoms and partly in such as are at a complete remove from all irregularity of form, there seems to be no support left for *Tonella*; for the plants which have been so named have not the least peculiarity of habit or aspect, or any fruit character. They are perfect collinsias in all but what is now shown to be the mere accident, of a plane rather than folded lower corolla-lobe. One of the two species affected by these considerations is

COLLINSIA TENELLA, Benth.; DC. Prod. x. 593 — *Tonella collinsioides*, Nutt. in Gray, Proc. Am. Acad. vii. 378, xi. 92, Bot. Cal. i. 555, & Syn. Fl. 257; the other is

COLLINSIA FLORIBUNDA — *Tonella floribunda*, Gray ll. cc.

SOME WEST AMERICAN ASPERIFOLIÆ.

II.

The new classification of our Pacific American Eritrichieæ proposed in these papers is founded largely in the nature of the pedicels and fruiting calyx, as will be seen by reference to pages 10 and 11 preceding, where also the very wide differences, in this regard, between *Allocarya* and *Krynitzkia* have been pointed out.

Two other new genera are now to be instituted; and it might be enough to say concerning *Oreocarya* that, in habit it is exceedingly well marked. *Lithospermum*, *Onosmodium* and *Onosma* are far more like each other in general appearance than are *Allocarya*, *Oreocarya* and *Krynitzkia*. But over and above the differences in habit, *Oreocarya* is

separate from *Krynitzkia* by its persistent fruiting calyx, and from *Allocarya* by the absence of all carination of the nutlets, whether dorsal or ventral.

Eremocarya is most excellently marked in a three fold way by its racemes, for they are biserial and very dense, conspicuously leafy-bracted, and repeatedly dichotomous. Moreover, it has a persistent open calyx and an enlarged persistent style.

Piptocalyx we may suppose to have been referred to *Krynitzkia* upon the general principle that, as we are obliged to admit into *Plagiobothrys* some exceptional species with circumscissile calyx, so we may do with *Krynitzkia*. But this is to ignore a great deal of what appertains to the question. In *Plagiobothrys* the pedicels are always persistent, whatever becomes of the calyx-limb, but it is far otherwise in *Krynitzkia* where, if *Piptocalyx* be placed we shall have both deciduous and persistent pedicels, for these latter are very persistent in *Piptocalyx*, while in the forty species of true *Krynitzkia* the pedicels are jointed with the rachis and fall away as soon as the seeds are ripe. And yet, dropping even this important failure of analogy between *Plagiobothrys* and *Krynitzkia*, with *Piptocalyx* included, there is a still stronger argument for the genus last named. Its impregnable defense is its peculiar dichotomy, which is cymose, somewhat imperfectly that of our depressed and compacted Caryophyllaceæ. For genera of Asperifoliæ better marks than these which distinguish *Eremocarya* and *Piptocalyx* are seldom found. And it is safe to say that if the plants were a foot or two high instead of three or four inches, these important matters would not have been overlooked, nor the species referred to genera in which, although there are geminate racemes, real dichotomy is unknown.

All the known species of these several genera have been so recently defined in the Synoptical Flora and its Supplement that to redescribe them now would be superfluous. It is indeed possible that confusion of species still exists in the

herbaria ; and more diligent collecting and collating of *Oreocarya* in particular, from all parts of the wide range of country which the genus occupies, is greatly to be desired, and will doubtless lead to the due recognition of several more species than we can now define.

OREOCARYA.

Inflorescence leafy-bracted, thyrsoid, (in one or two species rather racemose-paniculate); pedicels filiform, persistent. Calyx 5-parted to the base; segments lanceolate, their mid-vein seldom obvious, pilose-hispid, in fruit more or less spreading or recurved. Nutlets smooth or tuberculate or rugose, not carinate, their margins acute or scarious-winged, ventral groove usually closed, and at base divaricate.—Stout, coarse biennials and perennials, canescent or pilose-hispid; leaves mostly radical. Plants of the mountain districts of western North America, from Chihuahua to Manitoba and the eastern borders of California and Washington Territory.—Species of *Myosotis*, *Rochelia* and *Eritrichium* of various authors: *Krynitzkia* § *Pseudokrynitzkia* and part of § *Pterygium*, Asa Gray, Proc. Am. Acad. xx. and Syn. Fl. Suppl.

* *Flowers racemose-paniculate.*

+ *Fruit depressed; nutlets not winged.*

1. O. SUFFRUTICOSA.—*Myosotis suffruticosa*, Torr. Ann. Lyc. N. Y. ii. 225: *Eritrichium Jamesii*, Torr. Marcy Rep. 294, & Bot. Mex. Bound. 140; Gray l. c.; *Krynitzkia Jamesii*. Gray l. c.

2. O. PALMERI.—*Krynitzkia Palmeri*, Gray, Proc. Am. Acad. xx. 278.

+ + *Fruit pyramidal: nutlets winged.*

3. O. HOLOPTERA.—*Eritrichium holopterum*, Gray l. c. xii. 81, & *Krynitzkia*, l. c. xx. 276.

* * *Flowers thyrsoid-glomerate; fruit pyramidal*, i. e., *the 4 nutlets erect.*

+ *Nutlets wing-margined.*

4. O. SETOSISSIMA.—*Eritrichium* & *Krynitzkia*, Gray ll. cc.

+ + *Nutlets acutely margined.*

++ *Corolla-tube not elongated.*

5. O. VIRGATA.—*Eritrichium virgatum*, T. C. Porter, in Hayden, Geol. Rep. 1870, 479; *Krynitzkia virgata*, Gray l. c.

6. O. GLOMERATA.—*Cynoglossum glomeratum*, Pursh. Fl. ii. 729: *Myosotis*, Nutt. Gen. i. 112: *Rochelia*, Torr. Ann. Lyc. N. Y. ii. 225: *Eritrichium*, DC. Prod. x. 131: *Krynitzkia*, Gray, Proc. Am. Acad. xx. 279, & Syn. Fl. Suppl. 429.

7. O. SERICEA.—*Krynitzkia sericea*, Gray ll. cc.

++++ *Corolla-tube longer than the calyx.*

8. O. FULVOCANESCENS.—*Eritrichium fulvocanescens*, Gray, Proc. Am. Acad. x. 91, & Syn. Fl. 197: *Krynitzkia*, Gray ll. cc.

9. O. LEUCOPHÆA.—*Myosotis leucophæa*, Dougl. in Hook. Fl. ii. 82: *Eritrichium leucophæum*, A. DC. Prod. x. 129; Gray, Syn. Fl. 197: *Krynitzkia*, Gray ll. cc.

EREMOCARYA.

Racemes dense, biserial, leafy-bracted; pedicels filiform, short, and with the calyx persistent. Calyx 5-parted to the base, in fruit campanulate; segments nerveless, not hispid-

bristly. Nutlets neither margined nor carinate, erect, attached for their whole length, the groove open, little dilated and not furcate at base. Style enlarged in fruit and persistent.—Hirsute-canescent small annual herbs of the deserts of southern California, Arizona, etc. Leaves all in a radical rosulate tuft, the numerous racemose branches repeatedly dichotomous and conspicuously leafy-bracted. Roots imparting a deep purple stain, a property of *Plagiobothrys*, and *Piptocalyx*, but of no species of *Allocarya*, *Oreocarya* or *Krynitzkia*. A short bract at the base of each branch, the stems otherwise naked.

1. E. MICRANTHA. — *Eritrichium micranthum*, Torr. Bot. Mex. Bound. 141 ; Gray, Syn. Fl. 193, excl. var. *lepida* : *Krynitzkia micrantha*, Gray l. c. excl. var.

2. E. LEPIDA. — *Eritrichium micranthum*, var. *lepidum*, Gray l. c., also *Krynitzkia micrantha* var. *lepida*.

PIPTOCALYX, Torrey.

Calyx villous-hispid, 5-cleft to the middle, the tube scarious, circumscissile about midway, its lower part, together with the very short pedicel, persistent ; segments herbaceous, filiform, hispid-bristly, nerveless. Nutlets 4, not carinate, rather distinctly margined, tuberculate-roughened or smooth and shining, the ventral groove divaricately forked at base. Hispid-canescent, low, diffusely branching annuals, leafy-racemose and -glomerate throughout.—Wilkes Exped. xvii. 414. t. 12. *Krynitzkia*, sub-section *Piptocalyx*, Gray, Proc. Am. Acad. xx. 275.

1. P. CIRCUMSCISSUS, Torr. l. c. —*Lithospermum circumscissum*, Hook. & Arn. Bot. Beech. 370 : *Eritrichium circumscissum*, Gray, Proc. Am. Acad. x. 58, Bot. Cal. i. 527, and Syn. Fl. 193 : *Krynitzkia circumscissa*, Gray, Proc. Am. Acad. xx. 275 and Syn. Fl. Suppl. 428.

2. P. DICHOTOMUS.—*Krynitzkia dichotoma*, Greene, Bull. Cal. Acad. i. 206; Gray, Syn. Fl. Suppl. l. c.

MISCELLANEOUS SPECIES, NEW OR RARE.

ESCHSCHOLTZIA MARITIMA. Root perennial: stems stout and succulent, very leafy and dichotomous, 2—3 feet long, wholly prostrate: herbage very glaucous and also white-puberulent: leaves dense, *i. e.*, the spatulate-oblong obtuse segments numerous, short and crowded: torus with a manifest rim spreading horizontally: calyptra about a half inch long, oval, abruptly narrowed to a very short blunt or even retuse tip: corolla broad-campanulate; petals 10 lines long, lemon-yellow with a rhomboidal spot of orange at base: pod small: seed reticulate.

About Point Harris on the northeastern part of the island of San Miguel, on clayey slopes near the sea; very plentiful.

I was pleased with the dense handsome foliage of this plant when I was collecting it, but the minute white pubescence I mistook for a mere saline incrustation, such as many forms of vegetation are apt to acquire when growing, as this plant does, under the influence of the sea-spray. Thus I took it for simply a maritime state of *E. Californica*, preserved only a few specimens, and shortly after my return distributed them to correspondents under that name. But I also took care to bring a few ripe seeds, and from these I have a number of thrifty plants now more than eight months old and well in flower. Although they are growing in a rich garden soil most unlike that of their insular habitat, and some miles away from the sea, they exhibit all the peculiarities of the parent plants. I have now detected some characteristics which, in the hurry of my brief stay on the island, I overlooked.

In the specific character I have mentioned one peculiarity

of the calyx as it appears when fully grown and ready to fall; but there is something to be said concerning that calyptriform organ in its early and middle stages of development which is very interesting as well as highly instructive upon the matter of the affinity between *Eschscholtzia* and the Mexican plant, *Hunnemannia*.

The genus last named has been distinguished from the first by the two characters of a two-valved, instead of a calyptriform, calyx and by ovate obtuse, instead of filiform stigmata. In our new *Eschscholtzia* the very young flower buds exhibit strongly the appearance of two distinct valves to the calyx, for they are notched at the top and have a manifest channel running down to the torus from each side of the terminal notch, the whole young bud thus closely resembling that of a *Papaver*. In fuller growth, and especially when the calyptra is within a day or two of falling away, it appears somewhat quadrangular; for while the two primary sutural lines have become less distinct than they were, two others have become apparent, namely, one up and down the middle of each of what we may call the false valves; and, although in all other species of the genus whose flowering I have observed the yielding calyptra is ruptured on one side only, in this one a fissure takes place at the base of at least two, and sometimes three or even all four of the lines which I have described.

Furthermore: in the most robust one of all my growing plants the buds from their earliest appearing are actually open at the top, and thus the yellow of the petals is exhibited for a week before their full unfolding. In this individual the sundered tips of the calyx develop a few leaf-segments; but still, even here, the organ is cast off finally by means of fissures near its base.

I suppose that not even this most singular new *Eschscholtzia* will quite invalidate the genus *Hunnemannia*, which must be kept up in deference to its broad flat stigmata; for it is an order of plants in which any peculiarity of this organ has

been, and apparently must be, held as of great significancy in matters of classification. But lastly, it is in full accord with what we were beginning to learn about the relations of our Californian insular flora with that of Mexico, that this far off member of a group of islands singularly abounding in Eschscholtzias should be the one to furnish the connecting link, if not an actual point of fusion, between this genus and *Hunnemannia*.

STREPTANTHUS ALBIDUS. About two feet high and somewhat branching; some scattered short setose pubescence on the lower part of the stem and the lower leaves, otherwise glabrous, pale green and glaucous: leaves lanceolate, coarsely dentate, the teeth with broad callous tips; cauline with auriculate-clasping base: flowers rather large, the sepals ovate, strongly carinate, 3—4 lines long, white: petals 6 lines long, the upper pair erect and parallel, lower divergent, claw ovate-oblong, abruptly contracted at base, 1½ lines broad in the middle, lamina much crisped, white with purplish veinlets: upper pair of filaments united very nearly to the tip, their anthers reduced in size but polleniferous, scarcely divergent: silique unknown.

Hill-sides a few miles below San José, California, collected on the thirtieth of April, 1887, by Mr. Volney Rattan. A handsome white flowered species most related to *S. niger*, but of very different floral character.

THELYPODIUM RIGIDUM. One to three feet high, stout and with several stiff rather wide-spread branches from about midway, roughish below with a short bristly pubescence, glabrous above: leaves ample, oblong-lanceolate in outline, the lower somewhat lyrate-pinnatifid, the upper laciniate toothed, all narrowed to a petiole: upper half of stem and branches loosely racemose: pods about 1¼ inches long, almost sessile, ascending or somewhat spreading, rigid and sharply tipped with a short (rather more than a line long) style.

Common in fields about Antioch on the lower Sacramento, California, collected by the writer, April 17, 1887.

The plants were out of flower, nearly, but the stamens and petals are very much as in *T. lasiophyllum*, apparently, and the two are nearly related; but this plant has a peculiar habit, and its stiff sharp spreading and often slightly curved pods are in appearance more like thorns than siliques.

SILENE SIMULANS. Inflorescence viscid-puberulent, the herbage otherwise glabrous and dark green: stems a foot or two high, decumbent, from a thick fusiform perpendicular root: leaves narrowly linear-lanceolate, 2—3 inches long, the internodes short on the lower part of the stem and the axils bearing ovate scaly-bracted bulblets: flowers somewhat nodding, in a cymose panicle, deep scarlet: petals deeply 4-cleft, the upper two at a right angle with the calyx, the other three parallel with it, appendages erose: stamens declined: seeds strongly tuberculate on the back.

Islands of Santa Cruz and San Miguel, off the coast of California, collected by the writer in August and September, 1886.

A beautiful species, near *S. laciniata*, the flowers rather smaller and marked by the irregularity which characterizes, and may be taken as imitative of, those of the Zauschnerias with which it grows, for an account of which see page 25 preceding.

LEPIGONUM TENUE. Annual, slender but diffusely branching, forming depressed mats a foot broad, without viscosity or evident pubescence: leaves narrowly linear, an inch long: stipules inconspicuous, very short, often broader than long: flowers minute, innumerable, cymosely crowded on all but the lower parts of the branches, subsessile, or the earlier ones on pedicels of a line or two long: sepals obtuse, less than a line long, at first scarcely more than a half line: petals wanting: stamens 2 only: styles 3: capsule triquetrous, more than twice as long as the calyx: seeds numerous, minute, reddish

brown, obliquely pyriform, compressed, smooth, with a turgid margin around two of the sides and no trace of wing.

Common on elevated clayey spots around the salt marshes of Alameda, California ; collected by the writer in May, 1887.

A species extremely well marked by its superabundance of minute apetalous diandrous flowers and its long-exserted capsules, as well as by the diffuse and compact habit, some of the plants measuring a foot and a half in diameter and formed into a close mat. The branches are, however, extremely slender, and the herbage although appearing quite glabrous and free from viscidity exhibits, under a good magnifier, some very slender and spreading gland-tipped hairs upon the flowering branchlets.

CALYPTRIDIUM NUDUM. Root annual, fleshy-fibrous : leaves in a rosulate tuft, an inch or two long, consisting of an obovate obtuse or retuse mucronulate lamina narrowed into a petiole which is rather abruptly scarious-dilated at base : scapes 3—6 inches high, solitary or several from each root, naked, terminated by a compact orbicular capitate-crowded cluster of short spikes : petals narrowly spatulate : stamens conspicuously exserted : anthers linear.

Obtained on the summits of the Sierra Nevada, California, above Donner Lake, July, 1885, by my valued friend and correspondent, Mr. C. F. Sonne, of Truckee, whose unwillingness to let it pass for a form of the common *S. umbellatum* has led to this indication of its truly sufficient specific character. The specimens are in flower only ; but the slender naked scapes and small capitate flower-clusters mark it well, not to speak again of the peculiarly narrow petals.

LUPINUS FRANCISCANUS. Stems woody at base, producing numerous slender decumbent branches about a foot long : branches and lower surface of leaves silky-pubescent : petioles almost filiform ; leaflets 7—9, oblanceolate, acute, $\frac{1}{2}$—$\frac{3}{4}$ inch

long: raceme short-peduncled, few-flowered, the whorls often 2—3 only: flowers large; calyx-lips narrow, entire, subequal; corolla a half inch long, the banner and wings broad and obtuse, the former reflexed, very pale blue or white, wings and keel blue, or else the whole corolla pale yellow; keel strongly ciliate from base almost to apex: pods $1\frac{1}{2}$—2 inches long, pubescent, 6—8-seeded.

Confined to grassy northward slopes near the sea: very plentiful in such localities in the neighborhood of the Presidio and U. S. Marine Hospital, San Francisco; also on the highlands back of Pt. Pietras twenty miles southward, flowering from April to June.

The short, very leafy branches of this decidedly handsome lupine are nearly prostrate, from a hard thoroughly woody basal stem, the short racemes alone rising erect. Very different though it is in its appearance from the common yellow tree lupine of the San Francisco sand hills, this is its nearest ally, and the relationship is evinced by occasional hybrid plants. The flowers in the new species are quite as large and of the same form, but the racemes are unlike, consisting not rarely of a single whorl, though sometimes made up of four or five. I think the species must have been more or less imperfectly known to the compilers of the Botany of the Geological Survey, but am unable to identify it with any of the forms noted in that work.

LUPINUS PACHYLOBUS. Annual, a foot high, stoutish and with a few ascending branches from the base: hirsute throughout: petioles slender, elongated; leaflets 5—7, linear, $\frac{3}{4}$ inch long: racemes on stout peduncles, whorls 2—4: flowers $2\frac{1}{2}$ lines long, on pedicels of less than a line, deep blue; calyx-lips broad, the upper one notched and very short, the lower entire and twice as long: pod $1\frac{1}{4}$ inches long, 4—5 lines wide. hirsute, 4—6 seeded.

Briones Hills, east of San Pablo Creek, Contra Costa

County, California; collected by the writer, April 15, 1887.

A species in some respects intermediate between *L. micranthus* and *L. bicolor*, which two have unfortunately been confounded by recent authorities, but which are as well distinguished and as far from intergrading as any other two of our annual lupines which are not of different natural groups. *L. pachylobus* possesses something of the habit of *L. bicolor* and the small flowers of *L. micranthus*, but it has its own peculiar pubescence while its pods are remarkably unlike those of either of the two to which it stands nearest. In the fresh plant these are very thick and succulent, almost terete, weighing the branches, which are by no means weak, quite down to the ground.

Trifolium filipes. Erect, slender, a foot or more high, the root annual and herbage glabrous: leaflets linear, acute, spinulose-serrulate, an inch long, on petioles of a half inch, or those of the lowest much longer; stipules with subulate teeth: peduncles filiform, 2—3 inches long and far exceeding the leaves: head with a small, deeply laciniate-cleft involucre, 7—12-flowered: flower 2—3 lines long, purple and white, the wings meeting in front of the emarginate keel: calyx-teeth shorter than the tube, ovate-acuminate, spinose-tipped, entire, equal, the entire calyx in fruit compressed, the opposite pairs of teeth mutually appressed above the included obovate 2-seeded pod.

Apparently confined to wooded hills back of Berkeley and Oakland, California, growing with such plants as *Micromeria Douglasii*, *Trientalis Europea*, etc.: collected by the writer at Berkeley, and at Oakland by Mr. V. K. Chesnut. A very good species, related to *T. tridentatum*, which latter has some characters yet to be brought out.

Carpenteria Californica, Torr. Pl. Frem. 12. t. 7.—Some forty years have elapsed since General Fremont brought, from some uncertain locality in our Californian mountains, the

branch with leaves and capsules on which this genus is based. I am not aware that any botanist or collector has again met with it up to the present time ; but a few seedling plants of it have been growing upon the grounds of the University at Berkeley for perhaps ten years past, the seeds having been derived from some person whose name and address are long since lost, who sent mature capsules, in a letter, for identification : so that there is no new information forthcoming yet concerning the exact habitat of *Carpenteria*. Our cultivated specimens put forth their first flowers two or three years since. During the current season they have flowered for the first time very freely, and I take this earliest opportunity of giving an account of the flowers which have so long remained unknown.

But first of all, a correction or two must be made in regard to the published description of the stem and leaves.

There is but a very small and feeble aggregate of characters by which to distinguish *Carpenteria* from *Philadelphus*, even smaller than would appear from what is stated in the original description drawn up by Dr. Torrey, and in the "Genera Plantarum." In the last named work it is said that the branches are quadrangular ; I can hardly surmise upon what grounds, for no such character is indicated in Dr. Torrey's description, or exhibited by the accompanying figure, and in the living plant they are as perfectly terete as in *Philadelphus*.

Again, both the descriptions and the figure call for entire leaves, a thing which, if it were true, would strengthen the generic character : but in all our plants there are from twelve to twenty very manifest denticulations on every leaf. They are not the coarse or prominent teeth which one observes in *Philadelphus*, yet no one would say they are entire or even nearly so, yet the word of Bentham is "integerrima," and so they might be described from the table in the Plantæ Fremontianæ.

As to the flowers, the statement that the calyx is "5-parted" leaves one to the inference that the petals are five also ; but we find the flowers pretty constantly hexamerous, the sepals

and petals only now and then numbering five or seven each. The flower buds display the peculiarity of not being exactly orbicular, but noticeably elliptical in outline as seen from above, and the two sepals or segments which form each vertex of the ellipse are, in many of the lateral flowers, firmly coherent after the expansion of the petals and even to the end of their existence, so that we can in these instances call the calyx 4-parted, the normal condition in *Philadelphus*.

The six orbicular petals are not "convolute," two of them being wholly interior, two as wholly exterior, and two only taking the position which makes for a convolute æstivation.

The stamens, which number more than two hundred, are truly filiform except at their abruptly dilated base, and they are somewhat indefinitely gathered into six bundles alternating with the bases of the petals. There are traces of this bundling of stamens in our Pacific American species of *Philadelphus*, where also the ovary is less coherent with the calyx, or more superior, than in the eastern species; and the technical character of *Carpenteria* is upon the whole weakened rather than helped by these observations. As a genus it must stand, as we think, chiefly on its habit which is quite distinctive.

It is a low evergreen shrub with coriaceous leaves, rather compact as compared with *Philadelphus*. Our plants, now at least ten years old, are only three or four feet high, and yet in a thoroughly healthy condition. The branches are very flexible and tough, while those of *Philadelphus* are brittle. The bark and leaves have a bitter taste quite in contrast with the rather pleasant, mild flavor of the syringo or mock-orange. The flower-clusters are all terminal and long-peduncled; the flowers wholly scentless and about two inches in diameter, the corolla being exactly rotate. The clear white of the petals, relieved by the yellow tufts of almost innumerable stamens renders it one of the most showy and ornamental shrubs of the order to which it belongs.

RHAMNUS RUBRA. Branchlets slender and flexible with a

thin bark, the epidermis glabrous, reddish brown, smooth and shining: leaves thin, deciduous, short-petioled, narrowly oblong, obtuse or acutish, closely and finely serrulate, glabrous on both faces: flowers in loose axillary umbellate clusters, mostly pentamerous, all perfect: calyx segments campanulate-spreading: petals minute, externally setulose-hairy below the middle, each closely cucullate over and entirely concealing the anther which is inserted on a very short deltoid filament: styles mostly 2 only: fruit globose-pyriform, dark purple, 2-seeded.

Eastern base of the Sierra Nevada, near Truckee, California, the specimens from Mr. C. F. Sonne. Species allied to the evergreen *R. Calfornica* of the western part of California which has also been named *R. oleifolius* and which is of a quite different floral character, its calyx segments being rotate-spreading, its filaments subulate and sufficiently elongated to bear the anthers clear above the petals, which latter are entirely destitute of the hairiness which a good magnifying power reveals in those of *R. rubra*, so designated partly because it will be an easy and euphonious name, and partly because the outer bark has a red-brown tinge very unlike that of the species with which it will stand in closest juxtaposition.

RIBES AMICTUM. Cinereous-tomentose or glabrate, branches not prickly but with stout short triple thorns at the nodes: leaves small, 3—5-lobed: peduncles 1-flowered, the bract solitary, cucullate, completely enwrapping the ovary, deciduous, its margin entire, in pubescent forms tomentose-ciliate, in other forms nearly naked: calyx dark purple, 4—6 lines long, cylindrical-tubular with reflexed segments: filaments subulate, scarcely exceeding the erose-dentate involute white petals; anthers a line long, ovate, acute, tipped with a blunt or even truncate mucro: ovary prickly.

Interior valleys of Humboldt County, California, near Garberville, Miss Bush; also in Hoopa Valley, Mr. C. C. Marshall, 1887.

Shrub with the aspect of *R. Menziesii*, from which it is readily distinguished by the solitary deciduous bract which, until it falls away, enfolds the ovary. The proportions of tube and limb of the calyx are no less distinctive, the former being long, cylindrical and 10-striate. I am obliged to admit, as forms of one species, the almost hoary shrub of the Garberville region and the nearly glabrous one of the district farther north. This kind of variability is somewhat common on this coast, among the species of *Ribes*. My *R. velutinum* (Bull. Cal. Acad. i. 83), which, as I know it in northern California, is covered all over, even to the fruit, with an almost velvety pubescence, I now have from Mr. Cusick, of northern Oregon, in a perfectly glabrous state.

Œnothera (Sphærostigma) nitida. Biennial or perhaps perennial, the rigid stoutish wiry branches decumbent or prostrate, ½—1 foot long: leaves spatulate or oblanceolate, petiolate-narrowed, obtuse, entire, somewhat fleshy, glabrous, dark green and with a shining surface: flowers axillary, sessile; corolla an inch broad, yellow, fading green: capsule 10 lines long, coriaceous, smooth and shining, sharply quadrangular, gradually narrower above, strongly falcate-incurved: seed black, ovate, acute at base, compressed, smooth but dull, not shining.

Island of San Miguel, on the higher northern portion, growing with *Œ. cheiranthifolia* to which it is related. The dark shining foliage appears coriaceous when fresh, yet in drying comes down to the membranaceous.

Cnicus amplifolius. Herbage somewhat fleshy, green and glabrous except a sparse and minute arachnoid tomentum on the lower face of the leaves: stem stout, 3—4 feet high: leaves very ample, with crowded and imbricated, trifid, spinose-ciliate lobes, decurrent: heads clustered, an inch or more high, bracteose-leafy at base, the outer involucral scales loosely spreading and arachnoid, the inner appressed and

glabrous and their spinose tips reflexed, none gland-bearing: corollas bright purple, their linear obtuse lobes much shorter than the tube.

By streamlets in the mountains at Pt. Pietras, San Mateo County, California, collected by the writer, June 10, 1887.

Related to *C. edulis* but distinguished by its very ample somewhat succulent and quite decurrent leaves, as well as by the two different kinds of involucral scales, the inner being appressed and glabrous with reflexed spines while the outer are just those of *C. edulis*.

TROXIMON ELATUM. Annual, erect, 12—18 inches high, the proper stem 4—6 inches, simple below, above producing 6—10 elongated naked peduncles: pubescence sparse and hirsute or none: leaves oblanceolate, the lowest pinnatifid, the upper with few scattered and coarse teeth or lobes: ligules large, the expanded head more than an inch in diameter: akenes with or without wing-like costæ, the latter when present erose-denticulate and more or less undulate; pappus brownish, the filiform stipe 3—4 lines long.

Plains of the lower Sacramento, California: collected by the writer, near Elmira, May 3, 1886.

An ally of *T. heterophyllum* which is seldom half as large, and which in all its forms is marked by small ligules, such as when fully expanded, make a disk less than a half inch in diameter.

GILIA (NAVARRETIA) MELLITA. Slender and low, 2—5 inches high and with ascending or spreading branches, the branches glandular-villous: herbage very viscid and honey-scented: lowest leaves divided pinnately into subulate-acerose spine-like segments, those of the upper leafy-dilated and spine-tipped: corolla narrowly tubular-funnelform, not exceeding the calyx, very pale blue: stamens included.

Collected near Belmont, San Mateo County, California, June 23, 1886.

The plant is common in the locality, and doubtless elsewhere: in the dried specimen possible to be taken for a small variety of *G. squarrosa* which is a stout and coarse disgustingly mephitic-scented plant with thrice larger deep blue corollas and a more herbaceous foliage.

GILIA (NAVARRETIA) PARVULA. Low but stoutish with numerous short branches, 2—4 inches high: glandular-puberulent, very viscid and aromatic: lowest leaves linear, entire, the upper rather broader and with subulate teeth or segments: corolla about 4 lines long, broadly tubular-funnelform, light blue: stamens very unequal, the 2 posterior included, the 3 anterior long-exserted and declined.

Dry hills near Crystal Springs, San Mateo County, California, June 11, 1887.

Related to *G. heterodoxa* and *G. viscidula* but with the best of floral characters to distinguish it from both. The herbage is quite strong scented, but neither hircine like that of *G. cotulæfolia* nor mephitic as in *G. squarrosa*.

PENTSTEMON LEUCANTHUS. Stems erect from a woody base, 4—6 feet high: plant pallid and glaucous throughout: leaves linear-lanceolate, entire: thyrsus narrow, the flowers short-pedicelled: sepals ovate with a prominent acuminate tip: corolla white, 1—1½ inches long, the tube narrow, the limb bilabiate with rather short spreading lobes: anthers horseshoe-shaped, their edges muricate: sterile filament naked, obtuse at the short flattened apex.

San Rafael Mountains, Santa Barbara County, June, 1887, Mr. John Spence.

A species related to *P. heterophyllus*, which is a low and deep green plant with purple corollas as broad but only half as long as in the present species; also with a more elongated retuse tip to the sterile filament. If the flowers in this large and fine novelty are "pure white" as they are said to be, it should be desired in cultivation.

STACHYS CALIFORNICA, Benth.; DC. Prod. xii. 469.—An excellent species which Mr. Bentham could, in dried specimens, distinguish from *S. bullata*, but which American botanists in California as well as in Massachusetts have hitherto confounded with it.

It is many times larger (3—6 feet high) than *S. bullata* (1—2 feet): the herbage is very strongly aromatic, owing to abundant resinous dots on the lower face of the ample ovate-cordate leaves, with which the oblong-leaved *S. bullata* is not furnished: the corollas are of a deeper purple and have, when seen alive, a different aspect which when sought into appears to come from this, that the large lower lip has its two lateral lobes reflexed, the large middle one remaining concave, while in *S. bullata* the whole lower lip, middle lobe and all, has its margin reflexed.

S. Californica grows rankly in thickets and along streams to the southward of San Francisco throughout the State, and will perhaps include the *S. acuminata*, Greene (Bull. Cal. Acad. ii. 410); but this is not settled. It is six weeks later in flowering than is *S. bullata*, whose habitat is dry and open grounds chiefly, and to the eastward and far northward of that indicated for the other.

MUILLA TRANSMONTANA. Corm an inch or more in diameter, deep-seated: scape a foot or less in height, fusiform-enlarged for the length of an inch partly above and partly below the surface of the ground: umbel 12–30-flowered; pedicels an inch long or more: perianth rotate, white, fading with a tinge of lilac, the segments 3 lines long: filaments white-petaloid, ovate-acuminate, rather thick and fleshy, their margins meeting at base (but without increased dilatation) forming a shallow nectar-holding cup around the ovary: anthers minute, not a half line long, fixed by the middle.

At Reno, Nevada; fresh specimens communicated by Miss Amy Pease.

Very clearly distinct from the Californian maritime plant.

the flowers vividly suggesting the idea of a generical affinity with *Hesperoscordum* of Lindley: but the inarticulate pedicels of *Muilla* forbid the suggested union of this genus and that section of *Triteleia*.

HOOKERA LEPTANDRA. Scape slender, a foot high or less: umbels 2-flowered, pedicels 1—3 inches long: perianth purple, an inch long, the tube of one fourth that length, segments linear, spreading above the middle: free part of filament 3 lines long or more, supporting a linear anther of equal length which is bifid at base, obtuse at apex, the whole but a line shorter than the segments: staminodia pale, thin, involute-petaloid, retuse, a trifle surpassing the anthers.

A very good species by the characters of the very short tube and greatly elongated stamens and staminodia; obtained at Calistoga, California, June 25, 1887, by Dr. C. C. Parry.

A BOTANICAL EXCURSION TO THE ISLAND OF SAN MIGUEL.

The results of a botanical reconnoisance of Santa Cruz Island made during the summer of 1886 have recently been published in Bulletin 7 of the California Academy of Sciences.

On landing at Santa Barbara late in August with a collection so rich in new plants and every way so interesting, I could not let slip the opportunity which at once, and as if providentially, offered itself for my visiting, while yet several vacation weeks were before me, another member of this almost unknown group of islands.

San Miguel is one of the lesser of the units which together make up what Mr. Lyon has fitly designated as our South-

western Archipelago.[1] Its whole area is only fourteen[2] square miles; the length about eight and a half, the average breadth some two and three fourths miles. It is the westernmost and farthest seaward of them all, lying at a distance of nearly fifty miles in an air line from Santa Barbara, but, being also almost directly to the windward as the winds average, can seldom be reached without making a voyage of eighty miles. It is therefore seldom visited; and I could not but account myself fortunate in having an opportunity of undertaking a voyage thither immediately after having accomplished so fair a beginning in the way of an exploration of Santa Cruz.

A very small sloop, bearing a cargo of fence boards and five souls of us, sailed forth from Santa Barbara at noon of the nineteenth of August; and that our voyage was not without adventure will be indicated by the testimony that we did not reach the shores of San Miguel until nine days later.

I had anticipated that the vegetation of this islet would exhibit a decided character of its own. I had always understood that it was a low sandy island, presenting none of the rough mountainous characteristics of the rest of the archipelago. I had observed, from the mountains behind Santa Barbara, that on days when Anacapa, Santa Cruz, and Santa Rosa were in bright and cloudless sunshine, only a low fog-bank indicated the locality of San Miguel. My zeal for the botanical exploration of it had suffered but a slight abatement by remarks vouchsafed on the eve of my departure by some who had been there; one gentleman averring that it was all a naked sand-bank, and another that it bore no tree or bush of any kind, but only great beds of abronias and mesembrianthemums; and all my best anticipations were revived as, in the middle of an afternoon, under a propitious sky temporarily cleared of all mist and cloud, we passed around Point

[1] Botanical Gazette, xi. 197 & 330.

[2] The dimensions herein given are all taken from the Pacific Coast Pilot, Edition 4 now in press, the manuscript of which was kindly placed for my inspection as regards this island by my obliging friend the author, Professor George Davidson of the U. S. Coast and Geodetic Survey.

Issued July 12, 1887.

Harris and came into the still waters of the truly beautiful inlet known as Cuyler's Harbor. To the northward of our anchorage there was no beach, but above the low line of black cliffs arose banks of white sand two hundred feet high, their surface so smooth that from below the eye could follow the trail of every mouse that had lately traversed any portion of it; but eastward and southward ran a fine curve of white beach, above which, all the steeps were covered with shrubby lupines and erysimum together with interspersed patches of green suædas, yellow eschscholtzias, purple abronias and red eriogonum, besides abundance of malacothrix and astragalus; and nearly half the species which I noticed here while first wending my way upward to the summit of the island were at that time unknown to botanical science.

Topographically San Miguel is of the nature of a table-land, its shores rising for the most part abruptly to the height of from 200 to 300 feet. Its surface although not mountainous is uneven. The two greatest elevations, both of them rounded and mound-like, are respectively eastward and westward of the middle of the island; the eastern one having an altitude of 861, the western 850 feet; and Point Harris, a bold promontory jutting far out upon the northeast side is 550 feet high, the peninsula of which it is the terminus forming the shelter of Cuyler's Harbor from northwest winds and waves; and the harbor, perhaps two miles long and a mile or more wide, is rendered perfect by Prince's islet, a quarter of a mile long and 303 feet high, which rises in the way of occasional southwest storms. The shore line is extremely irregular, measuring 24 miles, while low reefs are common on all sides and at various distances from the shore.

Difficult of navigation as, owing to the abounding reefs and prevailing fogs, these waters are, the little harbor aforenamed is more secure when reached than any to be found on all our continental coast line for a thousand miles or more. It was here that Cabrillo wintered as long ago as 1542–3, and this island holds, in some unknown spot, the mortal remains of that earliest maritime explorer of California, for he died here.

The location of San Miguel is peculiar, necessarily affecting it with a climate considerably unlike that of the neighboring islands.

The most prominent feature of the whole Californian coast line is the promontory known as Point Conception. Above it the trend of the shores is north and south, below it east and west, and it is the point of separation between two quite distinct climatic regions on both land and sea. It wards off from both the continental shore and from the six principal islands, the force of the northwest winds and swell.

San Miguel alone, lying not at all to the sheltered eastward of this promontory, but directly to the southward and only thirty miles distant from it, is unprotected by it. It receives, therefore, the full force of the northwest winds, and that perhaps accelerated by their natural tendency to be drawn into the Santa Barbara Channel, of which it forms the western extremity of the seaward wall. Its condition is one of perpetually wind-swept and wave-beaten exposure.

We should not expect such an island to furnish an arboreal vegetation. Two stunted specimens of *Heteromeles arbutifolia*, neither of them more than ten feet high, exist in a sheltered spot near the head of a small cañon at the eastern end, while near the western extremity, in an open grassy valley looking southward there is a group of some thirty small trees of that interesting, peculiarly insular species, *Lavatera assurgentiflora*, a handsome shrub fast verging toward extinction on the few known insular localities, but one which will survive in cultivation where it has always been quite common since the earliest times of Californian colonization. As it survives in this particular locality upon San Miguel it bears quite a different aspect from that of the shrub known in cultivation. On my first beholding the trees I questioned whether they were not of a different species even. The branches seemed much stouter, the leaves several lines larger, the corollas of a deeper color, and the stellate pubescence of the pedicels and involucres a good deal more pronounced and conspicuous. But a slender form not to be distinguished

from that in cultivation was obtained by Mr. Lyon on an islet rock lying off Santa Catalina Island. The tradition is that the cultivated plant came from Anacapa; but none of the men, and I have met and conversed with a number who are more or less familiar with Anacapa, report having seen it there. The other specimens seen by me were three or four depressed and straggling bushes growing on an open slope fully exposed to the winds, at the very western end of San Miguel; and these although stunted by exposure were flowering and fruiting.

This extremity of the island is separated from the rest by a long and narrow neck of sand; it is in fact a separate islet at the highest tides; and at on an elevated situation just above the eastern end of the sandy isthmus I found impressive relics of the species as it flourished there in times past, namely, a few white petrified trunks standing above the sands, the larger of which were nearly a foot in diameter. These monumental trunks were quite fragile and of a calcareo-siliceous composition, the material which drifted upon and buried them, it may be while they were living trees, ultimately reducing them to their present state, being a mixture of sea-shell dust and sand, the former substance predominating.

There is evidence that at least one other ligneous plant was abundant at a time not long past. There is not, even now, any great scarcity of good fuel, although the island has had resident occupants and has been resorted to by considerable parties of seal hunters and fishermen for twenty-five or thirty years past. But the tree which has furnished this supply is virtually extinct and indeed has been so during the whole period referred to. It is *Rhus integrifolia*. I saw two or three individuals still showing feeble signs of life, and these were at the east end of the island; but all the higher middle portions, more especially on the north side, were once covered with the species in a low spreading form, such as it is wont to take on when growing in exposed situations along the main-land coast. I noted one of these insular skeleton trees, the wood of which was still hard and good, at least for fuel, whose

gnarled branches measured thirty feet long, all of them perfectly horizontal and not more than a foot above the ground.

This extinction of the former ligneous vegetation, now nearly total, appears to have been effected by the agency of the sands which have been drifted from the beaches of the windward parts of the island across its whole length, and which are to-day, partly piled in such magnificent heaps high over the northern side of Cuyler's Harbor, and partly still fast encroaching on and burying year by year, as the dwellers there showed me, more and more of the fertile grassy acres of the eastern portion. Those acquainted with the changeableness of sand dunes on Californian coasts wherever they occur will be able to understand how several miles of San Miguel rhus thicket might be buried deeply in one week, and then unearthed by the same agency of sea winds a few years, or even one year, afterwards.

Before passing to consider more particularly its botany I would record an observation or two relating to the ethnology of this curious islet. The great number of low rocky points and long stretches of reef, many of them connected with the main island, the higher of them resorted to by myriads of sea lion, seal, and water fowl, the lower and periodically submerged covered with shell fish; the plentiful occurrence of fresh water springs along all the northern and eastern shores —all these and other circumstances conspired to render Ciquimuymu[3] a paradise for any such race of people as, for example, the aborigines of our far northwestern coasts; and it has evidently sustained, at no very remote point of time, a dense aboriginal population. This is attested by the fact that the entire coast line of four and twenty miles is an almost uninterrupted line of kitchenmidding, marked here and there by heaps of human bones, many of them, particularly crania and jaw bones with teeth, in a good state of preservation. One bit of grassy headland on the southern shore well westward, a favorite camping ground with seal hunters, has been closely

[3] The aboriginal name of the island. See Prof. Davidson in Bulletin 6, Cal. Acad. Science, p. 333.

set about, by merry making men of that craft, with a circle of white skulls, their dark sockets looking seaward as if in contemplation of farther sunset shores, the whole array forming a lugubrious but unmistakable landmark.

By reference to the appended list of species observed on San Miguel it will be seen that ferns are altogether wanting there, although Santa Cruz yielded twelve.

Out of the hundred and twenty-one phanerogams a dozen are common old world weeds everywhere naturalized in California. Eleven are species indigenous on the continent but not credited to other islands. Five of the eleven, namely, *Potentilla Anserina*, *Cressa Cretica*, *Jaumea carnosa* and two species of *Salicornia* are plants which confine themselves to salt marshes; thus their occurrence on San Miguel alone of all the islands is because none of the others has as much as a square rod of that kind of ground. The other six are *Aplopappus ericoides*, *Troximon grandiflorum*, *Sidalcea malvæflora*, *Gilia micrantha*, *Plantago hirtella* and *Scirpus riparius*. These are plants of our northern coasts mainly, and are such as would reach San Miguel naturally, owing to the course of winds and currents, rather than the other islands. Each of these species is, however, rare in this new locality, a circumstance which indicates, as I suppose, that they formed no part of the old flora of San Miguel but have landed there in recent times.

The bulk of the present vegetation is made up of plants altogether insular. Twenty-four out of the hundred and twenty-one species are of this class, while the number of individuals is much more largely in its favor. The following, in so far as we know, are endemic on San Miguel itself: *Eschscholtzia maritima*, *Erysimum insulare*, *Astragalus Miguelensis*, *Œnothera nitida*, *Galium Miguelense*, *Cnicus* ——, *Phacelia scabrella* and *Corethrogyne filaginifolia*, var. *robusta*; only seven or eight, and yet quite an astonishing number of species to be confined to one small islet no farther removed than this one is from other lands; and if to about five of these, namely, the first four plus the

Phacelia, there be added the names of *Eriogonum rubescens* and *Malacothrix incana* which are otherwise reported from only a small bit of shore at the western extremity of Santa Cruz, and also *Abronia villosa* and a *mesembrianthemum*, the nine will comprise, I think, considerably more than two thirds of the present vegetation of the island exclusive of the grasses.

My catalogue is, I am bound to say, necessarily incomplete as regards the species and perhaps genera of the grasses But there is this marked peculiarity of San Miguel as compared with both the mainland and the adjacent islands, that its grass product consists, in the main, of perennial kinds. They were all past flowering and fruiting at the late date of my arrival, and consequently indeterminable, at least by any one not an agrostologist; but I judge that remarkably good and truly perennial pasturage covering the eastern third of the island to be constituted of two or three species of *Elymus* and *Agropyrum*, grasses which, on the mainland of California occur only somewhat sparingly and in the neighborhood of streams or in other moist places. These many acres of such pasturage have been the pride of the owner of San Miguel, whose horses, cows and sheep fare better on this cold bleak and desolate marine table-land and are much better secured against peril of starvation than are the flocks and herds on any of the larger and more fertile members of the archipelago where, as on the mainland, the grass species are annual and the crop yearly good or poor according to the winter rain fall. The prevalence of the perennial grasses here is not attributable to any greater annual fall of rain, for in this regard San Miguel is not favored above the adjacent islands, but to the almost continual fogs, a circumstance mentioned at the beginning of this paper. The fact has likewise been adverted to that the sands are fast encroaching on these pasture stretches of San Miguel; but in many places windward of these lines of encroachment I observed a peculiar looking grass-foliage peering above the surface of the older and more setled dunes which were otherwise destitute of vegetation, an

herbage too of which the sheep are fond enough. Whether this plant be a true grass or some sedge in a sterile condition I am unable to say ; but, at all events, it seems to give promise that grass lands lost here by the sands may ultimately renew themselves.

Upon the curious question of the origin of our insular flora in general, that of San Miguel in particular gives no new light. With its vast preponderance of endemic plants and such others as are unknown on the continent the mystery remains the same, or is even made more obscure, especially in view of the fact that this island is before all the others favorably located for receiving accessions from all along a vast north-eastward stretch of mainland territory, and from a region the climate of which is, in kind, its own. If the insular flora be the actual survival of an old flora of the continent, as my friend Professor Le Conte suggests, I would remark, without calling in question the probable correctness of that theory, it is not a little singular that none of these commonest plants of San Miguel have survived at any of those points along the coast where the climatic conditions are altogether similar. As I have indicated in my sketch of the Santa Cruz botany, a few insular plants occur in an enfeebled state at a few stations along the mainland shores ; and these, it will be maintained, are the co-survivals, on the continent, of the same primeval vegetation still abounding on the islands, a supposition which would seem a little more plausible if these specimens were found, as they never have been, in any other places than where they would inevitably have been landed in case they had come from the islands by help of wind and wave. The most perplexing of the cases in this particular category is presented in the flora of San Miguel. It is that of *Mesembrianthemum crystallinum*, than which no other one species of plant is so widely prevalent there, or grows in such rank luxuriance. All the hundreds of acres of higher and somewhat argillaceous land are thickly covered with it, the single specimens not rarely spreading over a six-foot breadth of ground. It is this which the unbotanical visitors see so much

of that they report ice plant to be almost the only vegetation there. The species is a native of southern Africa, but it has long been known as growing spontaneously around San Diego, where its existence has in times past been ascribed to accidental introduction. I do not see how it can henceforth be doubted that it is one of the waifs from Santa Cruz and San Miguel. Its depauperate condition just back from the beaches of southern California indicates that it does not find itself at home there as on the islands. The climate is too clear and dry. Its peculiar crystalline-dewy herbage requires a cool misty atmosphere for its better development. I can not but believe both that it is indigenous to these islands and that from them and not from Africa it was derived by the sea coasts of San Diego County. If it be one of the hale and vigorous remnants of an old Californian flora surviving on the islands then one would wish to consider its presence in San Diego County as a co-survival. But, from what has already been shown, its survival on the continent would naturally be looked for at the northward of San Miguel (where it is now the most characteristic plant), where the continental coast climate most resembles that of this particular island. But no trace of it is found in all our cooler and more humid northern ocean precincts. We find it on the mainland only when we have reached lines of shore washed by the very waves that have rolled in from the islands, and where the climatic conditions little favor it.

If it be doubted that the species is veritably indigenous to San Miguel, we are met by the question, how then, as a foreign importation, did it get there? Not by cultivation. No seeds have been sown here by the hand of man except those of lucerne and a few of the more common market-garden vegetables, and none of these plants have succeeded well. There are, truly, as our catalogue will show, not a few foreign and Old World plants run wild on San Miguel; but all of them are species long since naturalized throughout all central and northern parts of California. These came hither, doubtless, by the same agencies which brought the more than equal

number of native Californian plants. The peculiar character of the unquestionably introduced part of the San Miguel flora signifies so much that I will repeat it in connection with two other correlative facts: Point Conception and this island form a southern limit, seaward at least, to the general phytographic region of northern and central California: the northern and southern portions of the state have respectively their own naturalized foreign as well as native vegetation: the naturalized plants of San Miguel are actually (what we should expect them to be) those of the northern, not southern division of the mainland. This mesembrianthemum can not have reached the island from the northward, for it does not grow there now and there is no evidence that it ever did. It is not probable that it came from the mainland lying southeastward, for there are neither the winds nor the ocean currents to have brought it, the two climates are very dissimilar, and other more common and more migratory species of southern California have failed to come and plant themselves. The conclusion is fair, and even hard to avoid, that the species is indigenous to San Miguel. Its other native habitat is, as I have said, South Africa. And it may just as well be indigenous both there and here as may the lavateras of our islands find generic kindred nowhere in continental America north or south, but only in far off Australia and on the shores, still more remote, of the Mediterranean Sea.

The list of species is about as full as could be made so late in the year as September. The time given to the actual work of exploration was two weeks; and this, for a piece of territory at once so limited and so free from obstacles to pedestrian travel, was enough for a somewhat thorough canvass of the vegetation in so far as visible at that time of the year. But no doubt an equal number of days in April or May as actively devoted to research would considerably extend the list, a large proportion of the species being annual, and many such presumably so delicate as to have disappeared entirely, weeks or months before my search began. Of small perennials too, such as are vernal only in their flowering, — alliums, saxifrages

and the like—all, if any be there, must naturally have escaped me. Indeed several such plants were reported to me, and their special localities indicated; the next botanist who goes there, if it be in spring time, will doubtless find them, and perhaps many more.

I am not willing to conclude these remarks upon San Miguel botany without expressing my deep obligations to Mr. Warren H. Mills of San Francisco, the owner of this island, who so readily and effectively furthered the fulfillment of my wish to visit it; and to Mr. Warren F. Mills, a companion of the somewhat adventurous voyage, and my generous host and helper during the sojourn on the island. To both these gentlemen the student of these notes and of the following Catalogue is largely indebted for the interesting scientific results herein set forth.

A Catalogue of the Flowering Plants of the Island of San Miguel.

1. Ranunculus Deppei, Nutt.; Torr. & Gray, Fl. i. 21; Greene, Bull. Cal. Acad. ii. 388.—Common on the northward slope about midway of the island.

2. Platystemon Californicus, Benth. Trans. Hort. Soc. 2. i. 405.

3. Eschscholtzia maritima, Greene (See page 60).

4. Erysimum insulare, Greene, Bull. Torr. Club, xiii. 218.

5. Thelypodium lasiophyllum, Greene, l. c. 142.

6. Brassica campestris, Linn. Sp. Pl. 666.—Not prevalent.

7. Caisella divaricata, Walp. Repert. i. 175.—Quite

plentiful in one locality near the shore on the north side, the pods shorter than on the mainland, being almost orbicular; possibly distinct and new.

8. Lepidium lasiocarpum, Nutt.; Torr. & Gray, Fl. i. 115.

9. Oligomeris subulata, Boiss.—Very common.

10. Frankenia grandifolia, Cham. & Schlecht. Linnæa, i. 35.—Abundant in many places both near the shore and on elevated subsaline ground.

11. Silene antirrhina, Linn. Sp. Pl. i. 419.

12. Silene Gallica, Linn. l. c. 417.

13. Silene simulans, Greene (See page 63).

14. Lepigonum macrothecum, Fisch. & Mey. Kindb. Monog. 16.

15. Malva parviflora, Linn. Amœn. Acad. iii. 416: Greene, Bull. Cal. Acad. ii. 392.—Not frequent.

16. Lavatera assurgentiflora, Kellogg, Proc. Cal. Acad. i. 11 & 14 (See page 77).

17. Sidalcea malvæflora, Gray, Pl. Wright. i. 16.—Only one plant observed.

18. Erodium cicutarium, L'Her.; Hort. Kew. Ed. 1. ii. 414.

19. Erodium moschatum, Willd. Sp. Pl. iii. 631.

20. Rhamnus insularis, Kellogg, Proc. Cal. Acad. ii. 37: Greene, Bull. Cal. Acad. ii. 392.—Two or three reduced and feeble specimens among high rocks at the east end.

21. Ceanothus crassifolius, Torr. Pac. R. Rep. iv. 75.—With the preceding and as nearly extinct.

22. Rhus diversiloba, Torr. & Gray, Fl. i. 218.—One small bush in the Cañon del Mar.

23. Rhus integrifolia, Benth. & Hook. Gen. Pl. i. 419 (See page 78).

24. Lupinus Chamissonis, Esch. Mem. Acad. Petrop. x. 288.—Abundant on the sandy slopes on all sides of Cuyler's Harbor.

25. Lupinus arboreus, Sims, Bot. Mag. t. 682.—Summit of the island eastward; not plentiful.

26. Trifolium tridentatum, Lindl. Bot. Reg. xiii.

27. Melilotus parviflora, Desf. Fl. Atl. ii. 192.

28. Medicago denticulata, Willd.; DC. Prod. ii. 176.

29. Medicago sativa, Linn. Sp. Pl. 778.—Perhaps not quite naturalized.

30. Syrmatium patens, Greene, Bull. Cal. Acad. ii. 147.—Common in the upper part of the Cañon del Mar, also abundant on the summit of Prince's Island.

31. Astragalus Miguelensis, Greene (See page 33).—One of the very commonest plants of the island, prevailing everywhere.

32. Astragalus leucopsis, var. brachypus, Greene, l. c.

33. Vicia exigua, Nutt.; Torr. & Gray, Fl. i. 272.—Scarce.

34. Rubus ursinus, Cham. & Schlecht. Linnæa. ii. 11.—Northward slope of Prince's Island; not seen on San Miguel.

35. Potentilla Anserina, Linn. Sp. Pl. 495.—Springy places.

36. Heteromeles arbutifolia, Roemer, Syn. Monogr. iii. 105 (See page 77).

37. Cotyledon lanceolata, Watson, Bot. Cal. i. 211.

38. Zauschneria Californica, Presl. Rel. Hænk. ii. 28. t. 52.—Cañon del Mar ; a depressed and nearly glabrous form.

39. Œnothera bistorta, Nutt.; Torr. & Gray, Fl. i. 508.

40. Œnothera cheiranthifolia, Hornem.; Bot. Reg. t. 1040.

41. Œnothera nitida, Greene (See page 70).

42. Echinocystis macrocarpa, Greene, Bull. Cal. Acad. i. 188.

43. Echinocystis Guadalupensis, Cogn. in DC. Monogr. iii. 819.

44. Opuntia Engelmannii, var. littoralis, Engelm.; Bot. Cal. i. 248.

45. Mesembrianthemum æquilaterale, Haw. Misc. Nat. 77.

46. Mesembrianthemum crystallinum, Linn. Sp. Pl. 480. —For further notice see page 82.

47. Apiastrum augustifolium, Nutt.; Torr. & Gray, i. 644.

48. Berula augustifolia, Koch, Fl. ii. 433. Springy places.

49. Daucus pusillus, Michx. Fl. i. 164.

50. Galium Migueleense, Greene (See page 34).

51. Galium buxifolium, Greene, Bull. Cal. Acad. ii. 150).

52. GRINDELIA LATIFOLIA, Kellogg, Proc. Cal. Acad. v. 36. —Frequent on the northeastern part of the island, on high grounds. Although it has been reduced to a variety of *G. robusta*, it is one of the very best species of its genus. The broad, cordate leaves are very striking, but the absence of all gummy or resinous property is more remarkable. The species is otherwise known only through Dr. Kellogg's specimens from the island of Santa Rosa.

53. APLOPAPPUS ERICOIDES, Hook. & Arn. Bot. Beech. 146. —A single small bush just coming into flower, found on the hill side above Cuyler's Harbor.

54. BIGELOVIA VENETA, Gray, Proc. Am. Acad. viii. 368.— An erect form, with very broad leaves and whitish-tomentose even in age, occurs on ledges near the sea at the east end.

55. BIGELOVIA VENETA, var. SEDOIDES, Greene, Bull. Cal. Acad. ii. 400.—On the slopes of Pt. Harris, in depressed mats frequently six feet broad, the habit of *Arctostaphylos uva-ursi*.

56. CORETHROGYNE FILAGINIFOLIA, var. ROBUSTA.—Suffrutescent and low, the thick somewhat depressed or ascending branches only a foot high: panicle green and glandular-viscid, other parts whitish with an appressed tomentum.

Southeastern part of the island, among high rocks; also in great abundance on the top of Prince's Island. It might perhaps well be reckoned a distinct species.

57. ERIGERON GLAUCUS, Ker, Bot. Reg. t. 10.—Very common on all cliffs and steeps along the shores.

58. ERIGERON STENOPHYLLUS, Nutt. Pl. Gamb. 176; Greene, Bull. Cal. Acad. i. 88, not of Gray.—Only one specimen observed.

59. GNAPHALIUM SPRENGELII, Hook & Arn. Bot. Beech. 150.

60. Franseria bipinnatifida, Nutt. Trans. Am. Phil. Soc. vii. 507.

61. Franseria chamissonis, Less.; Linnæa, vi. 507.—This and the two preceding species all very common.

62. Leptosyne gigantea, Kellogg, Proc. Cal. Acad. iv. 198. —Very little of it on the main island, but forming a thicket on the summit of Prince's Island; the greenish-fleshy looking trunks and few stout suberect branches, at the summer season being leafless, recall certain cactaceous plants of the Mexican region.

63. Hemizonia fasciculata, Torr. & Gray, Fl. ii. 397.—Rather scarce, and only on the higher southeastern parts.

64. Layia platyglossa, Gray ?; Greene, Bull. Cal. Acad. ii. 403.—Same as that found on Santa Cruz, and apparently common, but past flowering and quite dead.

65. Jaumea carnosa, Gray, Bot. Cal. i. 372.—Abundant in a few places along the eastern shores.

66. Bæria Palmeri, var. Clementina, Gray, Syn. Fl. Suppl. 452.—Common here as on the other islands.

67. Eriophyllum confertiflorum, Gray, Proc. Am. Acad. xix. 25.—Very scarce.

68. Amblyopappus pusillus, Hook. & Arn.; Journ. Bot. iii. 321.—Common.

69. Achillæa Millefolium, Linn. Sp. Pl. 899.—Very common and the flowers very generally of a deep rose-purple.

70. Artemisia Californica, Less.; Linnæa, vi. 523.—Scarce.

71. Centaurea Melitensis, Linn. Sp. Pl. 917.—Not prevalent.

72. CNICUS OCCIDENTALIS, Gray, Proc. Am. Acad. x. 45.—High ground back of Cuyler's Harbor.

73. CNICUS ———. An undescribed species long past flowering, the stems stout and low, the leaves very broad, involucres large and the whole plant glabrous; observed at the base of Pt. Harris, on the landward side.

74. STEPHANOMERIA VIRGATA, Benth. Bot. Sulph. 32.—A stout and low state; found only at the northeast end.

75.—MALACOTHRIX TENUIFOLIA, Torr. & Gray, Fl. ii. 487.—In the Cañon del Mar.

76. MALACOTHRIX INCANA, Torr. & Gray, l. c. 486.—Abundant on all the slopes above Cuyler's Harbor, and northward to Pt. Harris.

77. MALACOTHRIX INDECORA, Greene, Bull. Cal. Acad. ii. 152.—One small plant, in the Cañon del Mar.

78. TROXIMON GRANDIFLORUM, Gray, Proc. Am. Acad. ix. 216.—Two plants seen, on high ground back of Cuyler's Harbor.

79. GILIA MICRANTHA, Steud. Nom. Bot. i. 684.

80. EUCRYPTA CHRYSANTHEMIFOLIA, Greene, Bull. Cal. Acad. i. 200.

81. PHACELIA VISCIDA, Torr. Bot. Mex. Bound. 143.[4]

82. PHACELIA SCABRELLA, Greene, Pittonia, i. 35.

83. HELIOTROPIUM CURASSAVICUM, Linn. Sp. Pl. 130.

84. KRYNITZKIA LEIOCARPA, Fisch. & Mey. Ind. Sem. Petrop. 1835. 36.

85. AMSINCKIA LYCOPSOIDES, Lehm. Ind. Sem. Hamb. 1831. 7.

[4] No 206 of the Santa Cruz list is this species.

86. Convolvulus macrostegius, Greene, Bull. Cal. Acad. i. 208. -Not common, but several plants were seen in flower.

87. Cressa cretica, Linn. Sp. Pl. 223.

88. Solanum Douglasii, Dun.; DC. Prod. xiii. 49.—Only one specimen observed.

89. Antirrhinum Nuttallianum, Benth.; DC. Prod. x. 592.

90. Castilleia affinis, Hook. & Arn. Bot. Beech. 154.—Near the sea, at the west end.

91. Castilleia hololeuca, Greene, W. Am. Sc. iii. 3: Pittonia, i. 38.—A few small bushes at the head of Cañon del Mar, flowering and fruiting.

92. Orthocarpus densiflorus, Benth. l. c. 536.

93. Verbena prostrata, R. Br. Hort. Kew. iv. 41.

94. Marrubium vulgare, Linn. l. c. 583. –But a single plant, but that in flower and fruit; the species therefore likely to become established.

95. Plantago Patagonica, Jacq. Ic. Rar. t. 306.

96. Plantago hirtella, HBK. Nov. Gen. & Spec. ii. 229.

97. Abronia maritima, Nutt.; Bot. Cal. ii. 4.—Common along the beaches.

98. Abronia umbellata, Lam. Ill. i. 469.—Abundant on dry sand dunes everywhere.

99. Rumex salicifolius, Weinm.; DC. Prod. xiv. 47.

100. Rumex maritimus, Linn. l. c. 335.

101. Eriogonum rubescens, Greene, Pittonia, i. 39.

102. Chenopodium murale, Linn. l. c. 219.

103. Chenopodium Californicum, Watson, Bot. Cal. ii. 48.

104. Atriplex leucophylla, Dietr. Syn. 536.—Very common on the beaches.

105. Atriplex Californica, Moq.; DC. Prod. xiii^2. 98.

106. Suæda Torreyana, Watson, Proc. Am. Acad. ix. 88. —Abundant back of Cuyler's Harbor.

107. Salicornia ambigua, Michx.; Watson, l. c. 125.—Abundant at the east end only.

108. Salicornia ———. An annual species on the same portion of the island, but on high ground.

109. Brodiæa insularis, Greene, Bull. Cal. Acad. ii. 134.

110. Sisyrinchium bellum, Watson, Proc. Am. Acad. xii. 277.

111. Juncus Balticus, Dethard.; Ic. Fl. Germ. ix. t. 411.

112. Scirpus riparius, Spreng. Syst. i. 208.

113. Phalaris Canariensis, Linn. l. c. 54.

114. Polypogon Monspeliensis, Desf.; Ic. Fl. Germ. i. 15.

115. Avena fatua, Linn. l. c. 80.

116. Distichlis spicata, Greene, Bull. Cal. Acad. ii. 415.

117. Bromus ———.

118. Elymus condensatus, Presl. Rel. Hænk. i. 265.

119. Agropyrum repens, Beauv.; Ic. Fl. Germ. t. 120.

120. Festuca Myurus, Linn. l. c. 74.

West American Phases of the Genus Potentilla.

Even excluding *Horkelia* and *Iresia*, the genus, like *Ribes* and *Saxifraga*, is unsatisfactory as embracing plants widely diverse in habit, inflorescence and floral structure. Take such common and widely dispersed species as *Potentilla Anserina* and *P. fruticosa*, and a philosophical botanist, set free from the domination of early bias, and capable of placing himself for the moment outside the sphere of book botany conventionalities, will not like to regard them as of one and the same genus, until, putting all the wide differences of mode of growth, foliage, and flower arrangement out of view, he severs a single flower from each plant and compares these organs alone. Then alone does it become easy to place the two species under one generic name. And as great discrepancies are seen by comparing a perfect plant of either of the two named with, for example, *P. arguta*, or any Old or New World species of the habitual group to which that one belongs.

There have not been wanting eminent phytographers to contend for the separating of the old *Potentilla* into several genera, for the resolving of *Ribes* into three or four, and of *Saxifraga* into ten or twelve. And there really seem to be, in the nature of the plants and in the structure of their flowers, as many reasons for the setting off of *Ribesia*, *Robsonia*, *Grossularia* and *Siphocalyx* from *Ribes*, as Richard and Spach proposed, as for the retaining of *Horkelia*, *Sibbaldia* and *Iresia* apart from *Potentilla*; and any anthological argument that has been employed in defense of those three, makes equally in favor of even Haworth's extreme views regarding the limitation of *Saxifraga*.

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Nothing which authors have thought to add, from Western America, to *Potentilla*, will introduce any new elements of diversity into the genus in so far as habit is concerned; for of the *Horkelia* series the first two species are at perfect agreement, in this respect, with the commonest typical *Potentilla* of the region which they inhabit, namely, *P. glandulosa;* and the bulk of them fall as readily in with *P. gracilis* and its near allies, in so far as mode of growth and characteristics of inflorescence are concerned. The only thing which gives to many of them a different look is the more dissected figure of the leaflets; but this mark, confessedly of no generical value even if it were universal, entirely fails in at least a half dozen otherwise most typical Horkelias, whose foliage is just that of the pinnate-leaved types of the more historical *Potentilla.* In most representatives of the *Ivesia* phase we are presented with short crowded and apparently verticillate leaflets; and this peculiarity, even if it were otherwise unknown in the alliance, would of itself have no more significancy than it has where, upon the *Ivesia* territory, it recurs in certain species of *Polemonium* and *Oxytropis.* But within the Old World type of *Potentilla* there is one species, *P. verticillaris* of China and Siberia, marked by essentially the same kind of foliage. The few Ivesias which bear their flowers in a close terminal cluster on erect and firm leafless and scape-like stems are the only plants, among all here under consideration, which will carry into *Potentilla,* as of old accepted, something slightly different, in the way of habit, from what has long had place there.

The floral characters of *Horkelia* have been said to be, a campanulate calyx, few and definite stamens, the latter with subulate or petaloid-dilated filaments. The calyx is, indeed, campanulate in the original of the species and several more, while in others it is as nearly rotate as in typical *Potentilla.* But what if in *Horkelia* it were always campanulate? Would it even then stand at all in the way of combining the species with the old *Potentilla?* There can only be a negative answer to these questions, if we look about amongst other assem-

blages of plants not distantly related to this one, such as have been already cited; for some Saxifrageous genera are apparently allied to *Potentilla* more closely in nature than is represented by their placing in our books. In *Saxifraga* the organ under consideration ranges from rotate to campanulate, and from polysepalous in some species to gamosepalous in others. In *Ribes* it even takes a wider range of forms, running all the way from the cyathiform to the long tubular; and that phase of the genus which exhibits the elongated tubular calyces appertains to the same phytographical district which gives us our *Horkelia* or species of *Potentilla* with calyx modified, but less so, in the same direction.

With reference to the few and definite stamens of *Horkelia* as a mark of distinction between it and ordinary *Potentilla*, suffice it to say that among the latter, stamens when as many as twenty, twenty-five or thirty to a flower, are often pretty definitely numerated, and are apt to be arranged more or less manifestly in five sets of four, five or six in each set, and that there is an Atlantic American species, *P. pentandra*, perfectly true to the old type of the genus, in which the stamens are definitely five only!

But the most essential character of *Horkelia*, according to the latest plea which has been made for the genus, is that of the petaloid dilatation of its filaments.[1] The omission of this feature from the generic character as framed in the first place by Chamisso, and as repeated by Endlicher, can not have been an oversight; it is too conspicuous a feature. But either of those celebrated authors may be presumed to have generalized upon this subject of dilated filaments, far enough to see that, in this particular alliance at least, it is a circumstance which will not bear weight as a generic character.

Within *Saxifraga* transitions are made from filiform filaments to such as are upwardly dilated, to subulate, and even to triangular-petaloid, and we have yet no *Horkelia* in which

[1] "This last and most distinguishing feature was omitted from the original generic character, and also from that of Endlicher." A. Gray. Proc. Am. Acad. vi. 528 (1865).

they are flattened to the degree last indicated. Moreover, to carry the generalization a little way in another direction; subulate-dilated filaments distinguish the principal group of our Californian wild gooseberries, but no one has thought of removing them from *Ribes* on that account, nor, I may add, on account of their peculiar cucullate-involute petals, which are a good deal more unlike those of East American and Old World phases of their genus than *Horkelia* petals are different from those of ordinary *Potentilla*.

If, then, we are to have in *Saxifraga*, as we do, the filaments ranging from filiform to deltoid, may we not allow a less range of diversity (an equal range is not required) in *Potentilla*? There is, it must again be said, no difference of habit to be noted between the original *Horkelia* and *Potentilla glandulosa*, which latter is the commonest western representative of the old type of the genus. But there is a new species herein to be described, so like *H. Californica* in appearance that in collecting it I made no duplicates, supposing it to be only a form of that species with leaves thinner and more dissected, but which I now find to combine a campanulate calyx, and definite (ten) stamens of *Horkelia* with filaments that are filiform. So complete an invalidation of Chamisso's genus was neither expected nor required.

Distinctions of the breadth and depth of the calyx failing to commend themselves as of generic value in the Rosaceo-Saxifrageous alliance, and few and definite stamens occurring in even the strictest type of original *Potentilla*, *Iresia* has no better foundation than that of the paucity of its pistils. Several of the species have, pretty constantly, two only, and one of them only one. But this, which is certainly an extreme condition of things in a genus normally, and on the whole so largely polygynous, is attended with no change in the nature of the carpel itself. That is essentially the same in all: moreover, the transition in *Iresia* from polygynous to monogynous species is as gradual as can be, some having almost always three pistils, others four or five; and upon the whole, these all, as regards their fruits, have the same relation to

their polygynous congeners that species of *Rubus* with very few and definite drupelets bear to others in whose fruits they are indefinitely numerous.

Too much account has been made, in times past, of the delicate, almost capillary inflorescence of *I. sanlotinoides*. It was this peculiarity which, in the main, influenced M. Baillon when he proposed to make of it a separate section of *Potentilla* under the name *Stellariopsis*. Yet this author did not, like Messrs. Brewer and Watson, erroneously characterize the inflorescence. The latter have called it a "diffuse panicle,"[2] whereas it is truly cymose, however diffuse, and, being cymose, is essentially that of all species of *Potentilla* whose flowers are not solitary.

I have seemed called upon to produce this explicit and somewhat lengthy statement of the case in hand, because, while neither *Horkelia* nor *Ivesia* found recognition either by Bentham or Baillon in their great treatises upon genera, in following those authors I am doubtless dissenting from the opinion of the most eminent and experienced of American botanists; for Professor Gray has, in recent years, here and there expressed his mind as for the retention of the first, if not for the second of the genera. It is not easy for an American who is not an authority, to take a step like this, knowing as he does beforehand that American authority will be against him. But unless I have culpably neglected the opportunities of the last ten years, I really ought to possess considerably more knowledge of the plants in question, than has been enjoyed by any other who has written upon them; and, feeling obliged to take the ground here taken, I have endeavored to give the reasons.

In assigning to the species their names under *Potentilla*, little effort will be made to group them. Even as subgenera *Horkelia* and *Ivesia* can not be limited otherwise than arbitrarily.

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[2] Bot. Cal. Geol. Surv. i. 183.

* *Flowers scattered, solitary in the forks and at the ends of the repeatedly dichotomous elongated branches.*

1. P. Californica — *Horkelia Californica*, Cham. & Schlecht. in Linnæa, ii. 26 (1827); Brew. & Wats. Bot. Cal. i. 181, excluding the variety *sericea* and the synonymy.—A large and coarse species, the bracts of calyx, commonly 3-toothed, sometimes 5-toothed, are even larger than the segments. The herbage is glandular and, when fresh, yields a strong fragrance like that of *Gnaphalium polycephalum* or *G. decurrens*. The species is common in the Mission Hills of San Francisco, on whatever lots or tracts of ground are fenced away from the inroads of cows and goats. It is also abundant along streamlets for twenty miles southward and as far northward of the Bay. It can not be identified from the description in the Botany of the State Geological Survey, which appears to have been drawn mainly from the wholly distinct *Horkelia cuneata*, Lindl. which is also there confused with the still more dissimilar *H. Kelloggii*, Greene. Whatever the *Potentilla multijuga* of Lehmann may be, it is evident it can not be the plant of Chamisso, for it is represented with a somewhat closely cymose inflorescence and cyathiform calyx. Any supposition of its being of the *Horkelia* phase of the genus involves an improbable oversight of the author and artist regarding the filaments, for they are represented as filiform. But the foliage and the habit are truly those of *H. cuneata*; yet, since Lehmann knew and accepted *Horkelia* as a genus, he could not easily have made or allowed this mistake; and his *P. multijuga* may yet be proven a true species of typical *Potentilla*, such as the figure most clearly indicates it to be.

2. P. elata. Two or three feet high, erect, rather softly hirsute throughout, the inflorescence glandular: radical leaves a foot long, leaflets in 7—9 pairs, thin, flabelliform, repeatedly incisely cleft: flowers solitary, in the upper axils, and terminal in threes; bracts of the calyx equalling the segments, all

triangular-lanceolate, entire and about as long as the broadly campanulate tube: stamens 10, unequal and unequally inserted, the five shorter filaments filiform throughout, the others deltoid-dilated just at the insertion, and filiform above: carpels broadly ovate-reniform, light-colored, with manifest nerves running obliquely from the minute supra-basal scar around and upward to the dorsal side of the apex.

Shady banks of the upper Napa River, a little above Calistoga, August, 1883. A single specimen, in fruit only, was taken in haste, and, at the time presumed to be only a slender state of the last species, with more divided foliage. The plant is perhaps no rarity in the region indicated, which is the upper Napa valley, already remarkable as the home of a number of species of plants not elsewhere detected.

** *Flowers cymosely but either compactly or diffusely gathered above midway of the stems.*

3. P. LINDLEYI — *Horkelia cuneata*, Lindl. Bot. Reg. xxiii. under t. 1997 (1837); Torr. & Gray, Fl. N. Am. i. 435; *H. Californica* in part of Brew. & Wats. Bot. Cal. l. c., not of Cham. & Schlecht.—Calyx merely cyathiform, not campanulate, its bracts smaller than the lobes and entire; whole plant of a dusky reddish hue and less than half the size of *P. Californica*: these characteristics, together with the different inflorescence abundantly distinguish this from the species with which it has been confounded by the authors above mentioned. It belongs, moreover, to a more southerly section of the Californian coast, although its proper habitat and that of *P. Californica* overlap in San Mateo County not more than fifteen miles below San Francisco. It is the common '*Horkelia*' of the Monterey region, where Douglas originally found it. There is a *P. cuneata*, Wallich.

4. P. KELLOGGII — *Horkelia Kelloggii*, Greene, Bull. Cal. Acad. ii. 416 (May, 1887): *Horkelia Californica*, var.

sericea, Brew. & Wats. l. c. —Since the publication of the description of this species, I have found a new locality for it, *i. e.*, a sandy bluff overlooking the ocean, near Lake Merced, some miles below the Cliff House. It may also be worthy of remark that the living plant has nothing at all of the fragrance of *P. Californica*, being wholly scentless, and without any glandular pubescence.

5. P. PUBERULA. Viscid-puberulent throughout, and with some short spreading hairs above, two feet high: leaflets in 5—8 pairs, ½—1 inch long, cuneate-oblong, simply and not deeply incised: calyx cyathiform, 4 lines broad, 3 in depth including the triangular-lanceolate segments; bracteoles oblong-lanceolate smaller than the segments: filaments white-petaloid and only slightly unequal; anthers linear-oblong, ½ line long: petals spatulate, white: pistils numerous: akenes ¾ line long, ovate-falcate, notably compressed.

Mesas five miles west of San Bernardino, California, S. B. Parish, No. 279, 1885. With considerable resemblance to *P. Kelloggii*, but a totally different pubescence and a more diffuse and less leafy inflorescence.

6. P. CLEVELANDI. Size and habit of the preceding, but more slender, more densely puberulent and not at all viscid: leaflets smaller, cuneate- to round-obovate, crenate-toothed: calyx half as large as in the last: filaments only lanceolate-dilated; anthers less than ½ line long and nearly as broad: petals apparently pale yellow: pistils rather few: akenes hardly ½ line long, broadly ovate with a slightly incurved tip, not compressed.

At Laguna, in the mountains back of San Diego, July, 1885, D. Cleveland: also collected on the northern part of the peninsula of Lower California, in the same month of the same year, by C. R. Orcutt, No. 905.

7. P. PARRYI = *Horkelia Parryi*, Greene, Bull. Cal. Acad. ii. 416 (May, 1887).—To the specific character should be

added: akenes oblong-reniform, light gray, minutely reticulate.

8. P. Bolanderi = *Horkelia Bolanderi*, Gray, Proc. Am. Acad. vii. 338 (1868); Brew. & Wats. Bot. Cal. i. 182.—Here the akenes are ovate-reniform, dark colored and vitreous-shining although minutely granular under a good magnifier. The species was rediscovered, near Epperson's Ranch, in Colusa County, Cal., in 1884, by Mrs. Curran.

9. P. Douglasii = *Horkelia fusca*, Lindl. Bot. Reg. l. c. (1837); Torr. & Gray, l. c.—There is a Mexican *P. fusca* of Chamisso.

10. P. ciliata. Green, but with some white silky-villous pubescence: radical leaves 6 inches long or more, the leaflets crowded and imbricated in more than 20 pairs, each primary leaflet divided into 3 oblong-linear entire secondaries: stems a foot or two high, slender, erect; cymes dense, flowers small: calyx minutely glandular, the segments lanceolate, much longer than the turbinate tube, and, with the narrower and somewhat shorter bracteoles, villous-ciliate: petals with narrowly oblong lamina and a slender claw of equal length: stamens 10; filaments scarcely dilated (narrowly subulate): carpels 1—3.

A single specimen, obtained in Owens' Valley, Inyo County, California, 1873, by the late Dr. Albert Kellogg.

The inflorescence is so like that of the common species, *P. Douglasii*, that without the leaves no one would be likely to suspect it of being anything else; yet, with its totally different foliage, petals and stamens, it can not be confounded with it. It is, moreover, in the character of its filaments as well as in foliage, an *Iresia*, notwithstanding its intimate relationship with *Horkelia fusca*, and so increases the number of those species which will reduce any recognition of these genera to a piece of artificial systematizing such as even Linnæus would have deprecated.

11. P. CAPITATA = *Horkelia capitata*, Lindl. l. c.; Torr. & Gray, l. c.

12. P. CONGESTA, Baillon, Hist. i. 369 (1869): *Horkelia congesta*, Hook. Bot. Mag. t. 2880 (1829); Torr. & Gray, l. c. 434; Gray, Proc. Am. Acad. vi. 529; Brew. and Wats. Bot. Cal. i. 181: *H. hirsuta*, Lindl. l. c. fide Gray, l. c.

13. P. ANDERSONII = *Horkelia parviflora*, Nutt. in Torr. & Gray, l. c. (1840); Gray l. c.—The name *parviflora*, although not admitted by Lehmann as designating any valid species of *Potentilla*, was employed by Desfontaines and again by Gaudichaud, therefore, as I judge, it may not be again employed. The *P. Nuttallii*, Lehm. precludes our dedicating this species to its first collector. It may be noted that in Watson's Index it is reduced to *H. fusca*. I am unacquainted with the plant, but Nuttall's judgment is what I defer to, for he knew it best.

14. P. HOWELLII. Slender, a foot high, clothed with a spreading villous pubescence: leaflets in 10—15 pairs, narrowly oblong, scarcely more than 2 lines long, mostly entire and acute, sometimes bifid: stems paniculately branching above, but the cymes congested, at least in early flowering: calyx-segments and bracteoles similar, broadly lanceolate: petals spatulate, obtuse: filaments petaloid-dilated, abruptly acuminate.

Near Waldo, Oregon, June 19, 1884, Thomas Howell. The specimens were distributed as "*Horkelia congesta*, var. *latiloba*, Watson;" but I am unable to discover here any special resemblance to that species.

15. P. SERICATA = *Horkelia sericata*, Wats. Proc. Am. Acad. xx. 364 (1885).

16. P. ARIZONICA = *Ivesia pinnatifida*, Wats. l. c.

17. P. LEMMONI = *Ivesia Lemmoni*, Wats. l. c. 365.

18. P. Tilingi = *Horkelia Tilingi*, Regel, Gart. Fl. 1872, t. 711: *Horkelia tridentata*, Torr. Pac. R. Rep. iv. 84. t. 6 (1857); Gray, Proc. Am. Acad. vi. 528 & 530; Brew. & Wats. l. c.: *Ivesia tridentata*, Gray, l. c. vii. 338.

19. P. tenuiloba = *Horkelia tenuiloba*, Gray, l. c. vi. 529 (1865); Brew. & Wats. l. c. 182.—This has lately been found as far down the Californian Coast Range as the County of San Luis Obispo; but it is still to be considered a rare species.

20. P. purpurascens = *Horkelia purpurascens*, Wats. Proc. Am. Acad. xi. 148 (1876); Brew. & Wats. l. c.: Rothrock, Bot. Wheeler Exp. 360 t. 3.

21. P. depauperata, Engelm. in Gray, Proc. Am. Acad. vii. 399 (1868): *Ivesia depauperata*, Gray, in Brew. & Wats. l. c. 184 (1876).

22. P. Kingii = *Ivesia Kingii*, Wats. Bot. King Rep. 90 & 448 (1871); Brew. & Wats. l. c.

23. P. Baileyi = *Ivesia Baileyi*, Wats. l. c.; Brew. & Wats. l. c.

24. P. Newberryi, Gray, Proc. Am. Acad. vi. 532 (1865); *Ivesia gracilis*, Torr. & Gray, Pac. R. Rep. vi. 72. t. 11 (1857); Brew. & Wats. l. c.

25. P. Pickeringii = *Ivesia Pickeringii*, Torr. Bot. Wilkes Exp. 288. t. 4 (1862); Gray, l. c. 531; Brew. & Wats. l. c. 182.

26. P. unguiculata = *Ivesia unguiculata*, Gray, l. c. vii. 339 (1868); Brew. & Wats. l. c. 183.

27. P. Webberi = *Ivesia Webberi*, Gray, l. c. x. 71 (1874): Brew. & Wats. l. c.

28. P. SANTOLINOIDES = *Ivesia santolinoides*, Gray, l. c. vi. 531 (1865); Brew. & Wats. l. c.

29. P. MUIRII = *Ivesia Muirii*, Gray, l. c. viii. 627 (1873); Brew. & Wats. l. c.

30. P. GORDONI = *Horkelia Gordoni*, Hook. in Kew Journ. Bot. v. 341, t. 12 (1853); *Ivesia Gordoni*, Torr. & Gray, Pac. R. Rep. vi. 72 (1855); Brew. & Wats. l. c. — Calyx campanulate: petals small, narrow and acute. The var. *lycopodioides* is but a reduced alpine state of the species, but the next is widely different.

31. P. DECIPIENS = *Ivesia pygmæa*, Gray, l. c. vi. 531; *I. Gordoni*, var. *pygmæa*, Wats. Bot. Cal. i. 183. — Calyx rotate, or very nearly so; petals oblong-obovate, retuse or emarginate, twice as large as in the last; filaments subulate.—In habit and foliage just like the alpine form of the last, but the herbage glandular, as was said by Dr. Gray, in the original character; but these resemblances could not have blinded the eyes of a botanist to the striking floral characters, if his dried specimens even had been fair ones. As in *P. Tilingi* and *purpurascens* we have plants of the *Horkelia* phase running into *Ivesia* completely, so here we have that which, although an *Ivesia* of the Ivesias at first sight, takes us back, by its calyx and filaments, to near our starting point amid the typical Horkelias. Even the inflorescence of this last species is, in its maturity open-cymose, almost as much so as in *Potentilla Plattensis*, in proportion to the size of the plant. I have not yet seen it growing, but excellent specimens, at several stages of growth, have been furnished by Mr. C. F. Sonne, of Truckee, Cal.

A variety (?) of the Old World *P. rupestris* has borne, and may perhaps again claim the rank and the name of *P. pygmœa*, Jord.

Some West American Asperifoliæ.

III.

Only three years since, the multitude of species discussed in this and two former papers under the above heading, were comprised in the genus *Eritrichium* as set forth by Professor Gray in Volume I., Part II., of the Synoptical Flora of North America. But long before the year 1884, the present writer, from his vantage-ground of familiar knowledge of the plants as they grow, had perceived the accepted *Eritrichium* to be a complex genus, and had thought to divide it into three or more by restoring, first of all, the old genera, *Plagiobothrys* and *Krynitzkia*, the names of which had been preserved as sub-generic under *Eritrichium* in the Synoptical Flora. In the summer of the year named, after much valuable material, of forms both old and new, representing the South as well as North American phases of the genera, had been amassed in the herbarium of the California Academy with a view to this new elaboration, the present writer disclosed his purpose to the celebrated author above named. The result was that Dr. Gray himself took the work in hand, and, at the end of the year, gave us his "Revision of some Borragineous Genera," in the pages of the American Academy Proceedings. The substance of this paper was shortly afterwards reprinted, forming the bulk of a supplement to the proper volume of the Flora.

Eritrichium, of which we had, as I supposed and still think, two species, suffered a complete extinction at the hands of Professor Gray, and the whole nomenclature of this large alliance was changed, saving only the names of the few originals of *Plagiobothrys* and *Krynitzkia*. In the course of the three years last past the number of species has been increased considerably, mainly through diligent field research carried on by my colleagues and correspondents; and now, in the series of papers of which this is the third, all the names

are changed again. My reasons for proposing two or three new genera have been given already. That the name *Krynitzkia*, with which people had barely had time to grow familiar, is to be dropped, is simply a historical necessity of the case, and therefore a thing for which I am not responsible.

The genus *Cryptanthe* of Lehmann, identical with *Krynitzkia* of Fischer & Meyer, antedates it by nine years. Such is the fact which has called forth the present paper. And, since this and the two which have preceded it, are so essentially of the nature of a commentary upon the most recent of Dr. Gray's several pronouncements on this tribe of plants, it may not lie beyond our province to enquire why an author in so good repute for botanical learning should have left *Cryptanthe* quite unmentioned. Conjectures upon this point would be sure to rise in the minds of the readers of these comments, after what has been already stated as a fact.

It might be surmised that even the name *Cryptanthe* had escaped his notice; that he did not know the fact of its existence. Such things occur in the labors of the best of botanists. The genus was published originally in a catalogue of the plants of a botanical garden. It was republished a few years subsequently in Linnæa, a journal whose earlier volumes, replete with valuable matter appertaining to the botany of Western America, are but too often neglected. It was yet again reprinted in Don's Dictionary, another work which has not always been duly respected as a book of botanical reference, although it contained much new matter, and cannot safely be left unreferred to. In this last named work, wherein the two then recognized species of *Cryptanthe* are described, the plant which was destined to figure as the type of *Krynitzkia* was still lurking under the genus *Echinospermum*; but before the appearing of the tenth volume of De Candolle's Prodromus a change had come to pass, and, while in that volume *Cryptanthe* was reduced to *Eritrichium*, the former *Echinospermum leiocarpum* stood forth as typical of a genus, under the name *Krynitzkia leiocarpa*. Any one

taking the Prodromus as a starting point in the history of these things would go astray.

A second conjecture might be this: that there was some uncertainty about the generical identity of the South American plants upon which *Cryptanthe* was founded, and the North American *Krynitzkia leiocarpa*. Fischer and Meyer, who founded the latter, were not ignorant of the former, but thought them generically distinct. The present writer has reason to think that the best herbaria in Eastern North America are but poorly supplied with Chilian plants; and we of the Pacific Coast enjoy peculiar facilities for interchange with Chili and Peru. Good native Chilian specimens of the plants on which *Cryptanthe* was established, authentically named by the venerable Alphonse De Candolle, he who reduced the genus to *Eritrichium* aforetime, we have access to; and these are our warrant for the conclusion that our many North American annuals lately named as species of *Krynitzkia* are, with the exception of those placed under *Allocarya*, *Eremocarya* and *Piptocalyx*, of the same genus with *Cryptanthe*.

It is, thirdly, not impossible that Dr. Gray, who is not unwavering in his adherence to principles of priority, may have recognized both the name *Cryptanthe* and the identity of the genus with *Krynitzkia*, and yet have thought best, for reasons of his own, to retain the nine years later name, and keep silence regarding the earlier but more obscure one. If this last conjecture be the true explanation, he will admit the present paper to have the force of a strong argument for strict priority in generic names at least; for had he, in the first place, as was his privilege, if not his duty, named our long list of species as species of *Cryptanthe*, no room would have been left for that which follows hereupon in augmentation of the Borragineous bibliography.

CRYPTANTHE, Lehmann.

Racemes or spikes naked. Calyx deciduous (except in some of the last group, *Pterygium*), together with its filiform pedicel when present, or the latter (in *C. racemosa*) persistent, 5-parted to the base; segments erect, usually closely embracing the fruit, the attenuate and elongated tips sometimes spreading above it and hispid with straight or hooked bristles. Nutlets 4 (sometimes by abortion 2 only or 1), smooth, tuberculate or muriculate, seldom rugulose, not carinate (though with a dorsal ridge in one or two species), often with acute or even strongly winged margins, attached from the base upwards commonly to near the apex; groove and scar open or closed.—Pilose-hispid slender annuals (except *C. racemosa*, a half-shrubby perennial), with bractless flowers rarely glomerate rather than spicate or racemose. Herbage and root imparting no stain. Leaves alternate, narrow and entire. Flowers in the South American type minute and cleistogamous, whence the generic name, not strictly appropriate to the North American species.—Lehm. Sem. Hort. Hamb. (1832); Fisch. & Mey. Sem. Hort. Petrop. (1836). 35; Linnæa (Litteratur Bericht), xi. (1837) 103; Don. Gen. Syst. iv. 373 (1838): *Krynitzkia*, Fisch. & Mey. Sem. Hort. Petrop. 1841. 52: Species of *Eritrichium*, A. DC. Prod. x, and of Gray, Syn. Fl. ii. part 1: *Krynitzkia* § *Eukrynitzkia*, Gray, Proc. Am. Acad. xx. and Syn. Fl. Suppl.

(A.) South American Species.[1]

1. C. GLOMERATA, Lehm. Erect, branching above, pubescence spreading and both setose and hirsute, the latter kind

[1] Of these I take up only such as exist in the herbarium of the California Academy of Sciences. There are, as Prof. Gray has remarked "many more in the books," and, I would add, doubtless many more genuine species in fact.

predominant ; floral leaves ovate-lanceolate, cauline lanceolate ; calyces in short naked racemes and leafy glomerules : nutlets usually solitary, dark colored, ovate, granulate, the closed groove opening at base into a transverse, rather crescent-shaped scar. -Sem. Hort. Hamb. l. c.; Don. l. c.: *Eritrichium cryptanthum*, A. DC. l. c. 129.

Native of Chili : nutlets like those of the Californian *C. muriculata*, but they are usually solitary, and the foliage and inflorescence are different.

2. C. MICROCARPA, Fisch. & Mey. Near the preceding but more setose-hispid : nutlets apparently always two, with sharply angled margins and an open groove of which the basal fork is divaricate and closed.—Sem. Hort. Petrop. 1835: Don. l. c. : *Eritrichium clandestinum*, A. DC. l. c.

3. C. CONGESTA. Erect, pubescent with spreading pilose hairs : leaves linear : racemes in pairs or threes on elongated naked peduncles : nutlets one or two, ovate-acuminate, somewhat incurved, carinate dorsally, sharply angled laterally and muriculate throughout. *Eritrichium congestum*, A. DC. l. c. 132.

The nutlets of this very distinct species were unknown to De Candolle. In our specimen they are too young to show the character of the ventral groove, etc.

4. C. LINEARIS. Habit of the last but more rigid and stout, setose-hispid: leaves narrowly linear, greatly elongated. (2—3 inches long): nutlets one or two, ovate, with obtuse dorsal ridge and lateral angles, densely and sharply muriculate. *Myosotis linearis*, Colla. fide. A. DC. l. c. 131.

5. C. GLAREOSA. Erect, slender, rather soft-hirsute ; leaves linear, an inch long : racemes nearly sessile, somewhat loose : nutlets ovate, neither ridged nor angled, transversely rugulose.—*Eritrichium glareosum*, Philippi in Herb. Cal. Acad.

Cordillera de Santiago, Philippi. A very well marked species.

Issued November 19, 1887.

6. C. DIMORPHA. Root perhaps biennial : stem stout and fructiferous below the short, leafy, racemose branches : pubescence soft and appressed : subradical flowers probably apetalous or cleistogamous, their nutlets ovate, more than 2 lines long, distinctly carinate dorsally, the marginal angles continuous across the back of the nutlet above its base, the whole surface coarsely granulate or tuberculate ; ventral groove narrow but not closed, ending below in an exactly basal, rounded and deeply impressed scar : fruit of the terminal inflorescence not seen.—*Eritrichium dimorphum*, Philippi in Herb. Cal. Acad.

Cordillera de Santiago, Philippi. A very singular species, allied to true *Eritrichium* by its nutlets, otherwise most unlike it.

(B.) North American Species.

* *Fruiting calyx closed, deciduous, its segments narrow, hispid.*

†—*Nutlets muriculate,*

††*one only, or one larger and less roughened.*

7. C. CRASSISEPALA = *Eritrichium crassisepalum*, T. & G. Pac. R. Rep. ii. 171 : *Krynitzkia*, Gray, Proc. Am. Acad. xx. 268, and Syn. Fl. Suppl. 424.

8. C. TEXANA = *Eritrichium Texanum*, A. DC. l. c. 130 : *Krynitzkia*, Gray, l. c.

9. C. ANGUSTIFOLIA = *Eritrichium angustifolium*, Torr. Pac. R. Rep. v. 363, and Bot. Mex. Bound. 141 ; *Krynitzkia*, Gray, l. c.

10. C. DUMETORUM = *Krynitzkia dumetorum*, Greene in Gray, l. c.

11. C. MICROMERES = *Eritrichium micromeres*, Gray, Proc. Am. Acad. xix. 90; *Krynitzkia*, Gray, l. c. xx. 274 & Syn. Fl. Suppl. 427.

Dr. Gray does not seem to have observed that one of the four nutlets in this species is more persistent than the rest and nearly or quite smooth. The plant has now been found on Santa Cruz Island, and also in Amador County, in the interior of the State.

++ ++ *Four nutlets present and all alike.*

12. C. MURICULATA = *Eritrichium? muriculatum*, A. DC. l. c.: *Krynitzkia muriculata*, Gray, l. c.—This species, common in the regions coastward, may be recognized by its light gray nutlets, short calyx and few spikes well developed.

13. C. JONESII = *Krynitzkia Jonesii*, Gray, Proc. Am. Acad. xx. 274 and Syn. Fl. Suppl. 427.—Differs from the last in no character of fruit, but only in habit and inflorescence, being strictly erect with numerous short branches paniculately arranged, as has been well indicated by Professor Gray in the original description. I obtained it in fine condition, as far southward as All Saints' Bay, in 1885.

14. C. AMBIGUA = *Krynitzkia ambigua*, Gray, l. c.—This and the next have elongated calyx-segments, and nutlets exceedingly unlike those of other species in being of a dark brown color, when mature, and having their muriculations few, scattered, and little elevated, scarcely to be called muriculations, not being sharp enough to bear properly that designation.

15. C. FOLIOSA = *Krynitzkia foliosa*, Greene, l. c.; Gray, Syn. Fl. Suppl. 427.—Peculiar to Guadalupe Island: established upon the best of characters as regards habit, pubescence, foliage, etc., the nutlets also grooved somewhat differently from those of the preceding.

16. C. DENTICULATA = *Krynitzkia denticulata*, Greene, Bull. Cal. Acad. i. 205; *K. muriculata*, Gray, ll. cc. in part.—Readily distinguishable from *C. muriculata* by the dark brown color of the nutlets, their sharper outline and manifest dorsal ridge (much like those of some Amsinckias), as well as by a very stout habit. Apparently confined to the region (so strangely abounding in peculiar plants), lying just along the eastern base of the middle California Sierra.

17. C. POLYCARPA. Coarse and stout but low and diffuse, 6—10 inches high, very hispid throughout, but more especially upon the calyx, which has a coat of white appressed setose pubescence beneath the bristles: flowers biserial in immumerable short crowded axillary and terminal spikes: calyx 2 lines long, the segments with somewhat foliaceous-dilated and spreading tips: nutlet ovate-deltoid, acute, little more than ½ line long, gray flecked with brown, the surface nearly as in *C. muriculata*, the elevations rather more numerous; groove closed above, the small triangular areola and nearly divaricate basal furcation open.

Around the Tahoe Ice Company's pond, two miles below Truckee, Cal., C. F. Somme, June and August, 1887.

Said to be abundant in its locality: the nutlets, much smaller than in *C. muriculata*, have also a broad truncate base and open bifurcation. In habit the plant is most like *C. crassisepala*, though with shorter and far more numerous spikes. The calyx is very promptly deciduous.

18. C. BARBIGERA = *Eritrichium barbigerum*, Gray, Syn. Fl. 194; *Krynitzkia*, Gray, Suppl. 273.—This and the next, while probably confluent, are very distinct from *C. ambigua*; for their nutlets are of the lightest gray, almost white, and are roughened with very prominent though not sharp murications.

19. C. INTERMEDIA = *Eritrichium intermedium*, Gray, l. c. and *Krynitzkia*, l. c.

20. C. ECHINELLA. A span high, with a few ascending and stoutish branches from the base: moderately pilose-hispid: spikes terminating the branches and branchlets, rather short, biserial: calyx 2 lines long, the segments attenuate above, erect: nutlets a line long, broadly ovate, acute, light gray, their whole surface densely covered with minute but well elevated and very sharp-pointed muriculations; groove apparently either open or closed, the basal forks of which, not divaricate but only moderately divergent, are always closed.

Mt. Stanford, above Donner Lake, 1886, Mr. Sonne. Extremely well marked in the murication of the nutlets. In habit like some Oregon plants which I refer to *C. ambigua*, but which are likely to prove the type of another unnamed species.

21. C. PUSILLA = *Eritrichium pusillum*, Torr. & Gray, Pac. R. Rep. ii. 171; *Krynitzkia*, Gray, l. c.

22. C. RAMOSA = *Eritrichium ramosum*, A. DC. l. c.; *Krynitzkia*, Gray, l. c.

23. C. RACEMOSA = *Eritrichium racemosum*, Watson in Gray, Proc. Am. Acad. xvii. 226; *Krynitzkia*, Greene, Bull. Cal. Acad. i. 208.—Apparently of this genus, although suffrutescent while all the rest are annual. The conspicuously pedicellate calyx is deciduous when ripe, by a joint at its very base, the pedicel remaining on the rachis. The species is surely a connecting link between *Cryptanthe* and *Oreocarya*, and many draw the latter genus into this, if in *Oreocarya*, calyces in maturity are in any cases deciduous (as I have now reason to suspect), unless it may stand on habit alone.

++ *Nutlets smooth and shining, light grey, or mottled with dark brown,*

+++ *solitary, or rarely two, the others abortive.*

24. C. FLACCIDA = *Myosotis flaccida*, Lehm. Pugill. ii. 22

(1830); Hook. Fl. ii. 82: *Eritrichium oxycaryum*, Gray. Proc. Am. Acad. x. 58 (1874), and Syn. Fl. 193: *Krynitzkia oxycarya*, Gray, l. c.

25. C. MICROSTACHYS = *Krynitzkia microstachys*, Greene in Gray, Proc. Am. Acad. xx. 269, and Syn. Fl. Suppl. 425.

26. C. ROSTELLATA = *Krynitzkia rostellata*, Greene, Bull. Cal. Acad. i. 203; Gray, Syn. Fl. Suppl., l. c.

27. C. SPARSIFLORA = *Krynitzkia sparsiflora*, Greene, l. c., and Gray l. c.

28. C. RAMOSISSIMA = *Krynitzkia ramosissima*, Greene. Bull. Cal. Acad. i. 203; Gray, Suppl. 428 and, in part, of Proc. Am. Acad. xx. 277.

29 C. GLOMERIFLORA. Annual, 2—4 inches high, diffusely branching and flowering from the base, very hispid throughout; leaves linear-oblong, $\frac{1}{4}$—$\frac{1}{2}$ inch long: flowers in glomerules of 2 or 3 in the axils of the leaves and at the ends of the branchlets: corolla very minute: calyx very bristly, its linear segments only $\frac{1}{2}$ line long, a little surpassed by the ovate-acuminate speckled nutlet whose ventral groove is closed throughout, not even opening into the depressed and wholly separate, obscurely triangular and entirely basal scar.

Borders of a pond two miles below Truckee, Cal., July, 1887. Mr. C. F. Sonne.

The wealth of the Truckee River region in peculiar plants of this alliance is remarkable, and is being well brought out by the zeal and diligence of Truckee's resident botanist. The present species has more points of contact with the very type of *Cryptanthe* than any other known plant of North America, witness the minute corollas and the inflorescence. The nutlet is altogether peculiar, its basal part being somewhat umbilicately gathered around the scar, which latter does not run into the groove at all.

30. C. CEDROSENSIS = *Krynitzkia Cedrosensis*, Greene, l. c. 204.

31. C. MARITIMA = *K. maritima*, Greene, l. c.

32. C. CLEVELANDI. A foot or more in height, with few ascending branches rather rigid, and bearing two or three short racemes at summit; hispid throughout with slender but rigid pungent bristles, and without appressed pubescence: calyx slender, appressed to the rachis (as in *C. flaccida*): nutlets 2 or 1.

Common in shaded places along streamlets in the hills back of San Diego, where it was collected by Mr. Cleveland and the writer in April, 1885, the specimens having been largely distributed by me as "*K. microstachys*, Greene," from which it is very distinct, being as it were intermediate between that and *C. leiocarpa*, but with more slender nutlets than those of that species. It was also obtained, in the same year at All Saint's Bay, Lower California

++ ++ *Nutlets four.*

33. C. LEIOCARPA = *Echinospermum leiocarpum*, Fisch. & Mey. Sem. Hort. Petrop. 1835. 36, also in Linnæa (Lit. Bericht), 1837. 104; Don. Gen. Syst. iv. 373: *Krynitzkia leiocarpa*, Fisch. & Mey. op. cit. 1841. 52: A. DC. Prodr. x. 134; Gray, l. c.—Six inches to a foot high, diffusely branched, canescent with an appressed pubescence, and with more or less of pilose-hispid spreading hairs: inflorescence short-spicate or somewhat glomerate and leafy: calyx a line long, the segments not much elongated or attenuate above the nutlets, the latter with closed groove which is not forked at base.

Common in the sand hills of San Francisco, well out on California street, April, 1886; also obtained at Point Reyes by Mrs. Curran, and near Gilroy by Mr. Hickman. Plant seldom much hispid except upon the calyx, and, in the San Francisco

locality scarcely at all so, but almost silvery canescent with quite soft appressed hairs.

34. C. HISPIDISSIMA. A foot high or more, with ascending branches; strongly pilose-hispid throughout, and without different appressed pubescence under the spreading: inflorescence elongated and loosely spicate, never leafy or glomerate: calyx $1\frac{1}{2}$—2 lines long, the segments long-attenuate, far exceeding the nutlets: corolla large and conspicuous: nutlets of the preceding species.

San Luis Obispo County, Cal., J. G. Lemmon, 1887. Plant with the aspect, and the rather showy corollas of *C. barbigera*, and so not resembling *C. leiocarpa;* like that only when the nutlets alone are considered. Old specimens of what is apparently the same were obtained by Mrs. Curran in 1886, in the Salinas Valley, some distance north of Mr. Lemmon's locality; and my *Krynitzkia leiocarpa* of the Santa Barbara islands, although somewhat less hispid than Mr. Lemmon's type, belongs here.

35. C. NEMACLADA. Slender, very diffusely branching, a foot high, sparsely setose-hispid and green, *i. e.*, lacking canescent appressed hairs: spikes very loose, almost filiform: calyx a line long, appressed to the rachis, the segments hispid below the middle, their filiform upper portion retrorsely setulose: nutlets ovate-acuminate, $\frac{1}{2}$ line long, smooth and shining, the groove bifurcate at base but closed throughout.

Colusa County, Cal., 1884, Mrs. Curran. Only one specimen, and that inadvertently left by me, as a large state of *C. sparsiflora*, at the time when the latter (under *Krynitzkia*) was published; its widely different character now first detected.

36. C. TORREYANA = *Krynitzkia Torreyana*, Gray, l. c.— This species and the next, so precisely similar in aspect, have been well distinguished by Professor Gray by the fine character of a slight but constant difference in the insertion of the

nutlets. There is an additional character, belonging to the vegetative organs, which none but the collector would be likely to take cognizance of, *i. e.*, a peculiar brittleness of texture in the present species. The var. *calycosa* is of singular appearance when compared with the type, but is no doubt best left as Dr. Gray has placed it.

37. C. AFFINIS = *K. affinis*, Gray, l. c.

38. C. GEMINATA. Size, habit, pubescence, etc., of the last: calyx a line or more long, segments without attenuate tips and little exceeding the nutlets, these also like those of *C. affinis* in outline, but closely appressed to each other in pairs, and all four somewhat laterally attached to the gynobase!

I have heretofore spoken of the singular pairing off of the four nutlets in *Oreocarya suffruticosa*, and in *Somea hispida*. In the present remarkable plant the groove of the nutlet is as in *C. affinis* except that it runs up and down, not in the middle but very near one edge, so that the nutlets themselves sit in the calyx, very flatly face to face in pairs. The ovary itself is obviously compressed, and thus, in young calyces. when dried under pressure, the circumstance might pass for a result of the mere accident of pressing for the herbarium. But the perfectly ripe fruit exhibits unmistakably all the characteristics above ascribed; and, what is more, the collectors of the species both assure me that it is an obvious mark of the plant as seen growing. Aside from this, the short segments of the calyx (not concealing, but freely exposing the curiously geminate-compressed fruit) are about the only mark by which the species is seen to be distinct from its relative and associate. I say associate because the two species grow together in the neighborhood of Truckee, Cal., where they have been abundantly collected by Mrs. Curran and by Mr. Sonne. *C. geminata* I have not met with from elsewhere.

39. C. WATSONI = *Eritrichium leiocarpum*, Wats. Bot. King. 244 in part, fide Gray: *Krynitzkia Watsoni*, Gray, l. c.

40. C. PATTERSONI = *Krynitzkia Pattersoni*. Gray, Proc. Am. Acad. xx. 268; Syn. Fl. Suppl. 424.

41. C. FENDLERI = *K. Fendleri*, Gray, ll. cc.

* * *Calyx persistent, spreading and discharging the nutlets, the segments broader and less bristly.*—PTERYGIUM.

+ *Nutlets broadly winged.*

42. C. PTEROCARYA = *Eritrichium pterocaryum*, Torr. Bot. Wilkes Exp. 415. t. 13; Gray, Syn. Fl. 195: *Krynitzkia pterocarya*, Gray, Proc. Am. Acad. l. c. 276; Suppl. 429.

43. C. CYCLOPTERA = *K. cycloptera*, Greene, Bull. Cal. Acad. i. 207.

+ + *Nutlets acutely angled.*

44. C. OXYGONA = *K. oxygona*, Gray. Proc. Am. Acad. l. c. 277; Suppl. 427.

45. C. MOHAVENSIS = *K. Mohavensis*. Greene, l. c.: Gray. Suppl. l. c.

46. C. UTAHENSIS = *K. Utahensis*, Gray. Suppl. l. c.

SOME AMERICAN POLEMONIACEÆ.

I.

One may now say of this family of plants. almost unqualifiedly. that it belongs to the western side of the North American Continent. Africa. Australia and the oceanic island-groups

have no species; Asia and Europe together, two or three: South America perhaps fifteen, and the Atlantic United States about as many. The Pacific States, with Mexico and British Columbia, have a hundred and fifty species, or more; and new ones are still yearly coming in from various parts of this great region whose botanical products will not all be known for many decades to come.

Many of our Polemoniaceæ are highly ornamental when in flower, and collectors have been accustomed to make specimens of them in this state only. The elaboration of the genera and species has been done, in the herbaria, in parts of the world very remote from the habitat of the plants, and the characters relied on have been those of the flower, chiefly of the corolla and gynœcium. This, which I conceive to have been an erroneous method of the systematists in relation to this order, was necessitated, in the first place, by collectors neglecting mature and fruiting specimens, and has in turn encouraged workers in the field to keep on as they had begun, making the flowering plant in all its beauty, the herbarium subject, and leaving the ugly and often hardly manageable fruiting plants ungathered.

The one general conclusion reached by me, after eighteen years of field experience with these plants is, that characters of form of corolla and length, insertion, direction, etc. of stamens may be set aside as wholly incompetent to furnish means of defining genera; and that, by the calyx alone, especially as it appears not in flower, but in its after developments, in and of itself and in its relation to the fruit, we may limit and define good acceptable genera, made up of plants agreeing in habit, and in some other minor points.

In order to make use of the characters indicated, we must, I think, entirely lay aside, what I conceive to be a mere prejudice, the notion that the form of the corolla, and the direction of the stamens—whether erect and straight, or curved and declinate—need to be considered at all, in the matter of generical diagnosis. At all events, that is the ground upon which the new elaboration I have in mind, will proceed. The

characters of a rotate or campanulate corolla, and free and declined stamens were virtually abandoned for *Polemonium* when *P. confertum* was admitted: and the genus was then acknowledged by Dr. Gray, to have no other foundation than that of its peculiar habit.[1] We think it has somewhat more than that to rest on, though not so very much more.

The three genera to be discussed in the present paper differ from the others in the order, in respect to the relations of the fruiting calyx to the fruit itself. After flowering, the calyx continues to grow, more than keeping pace with the development of the capsule, so that when the latter is mature it is scarcely in contact with the former. This characteristic, *Polemonium*, *Collomia* and *Navarretia* have in common. In *Phlox* and in *Gilia* the calyx becomes distended by the capsule before its maturity, and is eventually ruptured by it.

Polemonium is most nearly related to the Ipomopsis section of *Gilia*. This is well shown in that very natural arrangement, or ordering of the genera which Dr. Gray has given us in the Synoptical Flora. But in my view, *Polemonium* is to end where the calyx ceases to be herbaceous and flaccid to the very tips of its segments, and where the latter cease to remain erect, above a tube which is not costate or with hyaline intervals below the sinuses.

Collomia, restricted to species well at agreement in habit, is marked, as will be seen, by a character precisely analogous to that which so good a genus as *Nemophila* rejoices in among the Hydrophyllaceæ, though in *Collomia* the mark is absent at flowering time, making its appearance later on, but is always conspicuous in the fruiting plant. The calyx here is also more or less scarious below, and distinctly angular: the segments perfectly equal and rigid, often aristate-pointed.

In *Navarretia* we have the calyx of *Collomia* without the replicate sinuses and with a very irregular limb, two or three of the segments being two or three times larger than the other two or three, the smallest being aristate-pointed, the largest

[1] Syn. Fl. Vol. ii. part 1. p. 150.

usually spinose-toothed or -cleft. The calyx here is seldom or never cyathiform-spreading as in *Collomia*. sometimes even urceolate-constricted above the capsule. yet is never distended or ultimately ruptured by it. as happens in *Gilia* and *Phlox*. The astonishing range of variability in the capsule in *Navarretia* which will be brought to view in the classification and description of species is almost something new in kind. in the annals of carpology. I think. On the strength of these differences. if they had been known in earlier days. a number of genera would surely have been proposed.

POLEMONIUM.

Tourn. Inst. 146. t. 61 : Linn. Gen. ed. 2. 56 ; Adans. Fam. ii. 214 ; Juss. Gen. 136 ; Nutt. Gen. i. 127 ; Benth. in DC. Prodr. ix. 316 ; Benth. & Hook. Gen. ii. 823 ; Gray. Syn. Fl. ii. part 1. 129.

Calyx herbaceous throughout. neither angled nor costate. slightly accrescent and loosely investing the capsule. campanulate or narrower. cleft to the middle. the segments lanceolate or broader. equal. erect or connivent over the capsule. or campanulate-spreading. entire. never recurved nor aristate-pointed. Corolla regular. from nearly rotate to tubular-funnelform. blue. white or yellow. rarely purplish. Stamens free or adherent. and. in most species more or less declined according to the form of the corolla. Seeds angular or winged. developing mucilage when moistened.—Herbaceous plants with alternate. pinnate. flaccid leaves. the leaflets or leaf-segments sessile and entire. Inflorescence cymose-paniculate or thyrsiform or racemose. except in the first species.

**Root annual : flowers solitary opposite the leaves. Species not typical.*

1. P. MICRANTHUM. Benth. in DC. Prodr. ix. 318 : Gray. Bot. Cal. i. 499 & Syn. Fl. l. c. 151.—Like a *Gilia* in habit. it

is a true *Polemonium* by its calyx and seeds; habitat from mountains of southern California (Tehachapi, Mrs. Curran) to British Columbia; also in Chili.

* * *Root perennial; corolla campanulate; stamens free or nearly so and strongly declined. Typical species.*

+ *Stem-leaves few; inflorescence loose and open.*

2. P. REPTANS, Linn.; Lam. Ill. t. 106; Gray, Manual, ed. 5. 371; Syn. Fl. l. c.—Middle and northern valley of the Mississippi and eastward to New York.

3. P. PULCHELLUM, Bunge, in Ledeb. Fl. Alt. i. 233; *P. humile*, var. *pulchellum*, Gray, Syn. Fl. l. c. 150.—Subalpine in the high mountains from Colorado to California and far northward. Usually 6—10 inches high, the flowers small and light blue.

4. P. CARNEUM, Gray, l. c. 151.—Oak woods of central and northern California. A large and most beautiful species, the salmon-colored corollas an inch broad.

+ + *Stems leafy; inflorescence more congested and terminal.*

5. P. FLAVUM, Greene, Bot. Gazette, vi. 217; Gray, Syn. Fl. Suppl. 412. — A tall species of the higher mountains of New Mexico and Arizona; corollas reddish yellow, very large. the lobes acuminate.

6. P. FILICINUM. Three feet high or more, slender. glabrous up to the inflorescence which is rather densely glandular-viscid: leaves ovate-oblong in outline. the segments lanceolate, acute, somewhat closely ranged and decurrent upon the rachis: inflorescence corymbose-congested: segments of the calyx erect, lanceolate, longer than the tube: corolla deep purple, campanulate, 5—6 lines broad, the segments ovate, acute: stamens declined and incurved, reaching little

beyond midway of the corolla: style exserted; seeds very dark brown, sharply angled.

Pinos Altos Mountains, southern New Mexico, collected by the writer in October, 1880. A tall and very graceful species with fern-like foliage and a solitary rather close terminal corymb.

7. P. PECTINATUM, Greene, Bull. Cal. Acad. i. 10; Gray, l. c.—Well marked by its narrowly linear leaflets. Perhaps a rare plant, having been collected only by Professor Hilgard, in the eastern part of Washington Territory, in leaf and fruit only.

8. P. FOLIOSISSIMUM, Gray, Syn. Fl. ii. part 1. 151.—A species of the Colorado Rocky Mountain region, two feet or more in height, very viscid and mephitic scented, the flowers blue and smaller than in the others to which it is most nearly related.

†† ††† *Stems very leafy at or near the base, naked, or nearly so, above; flowers very few and cymose or many in racemose or thyrsoid clusters.*

9. P. CŒRULEUM, Linn. Sp. Pl. 162, in part; Benth. l. c. 317; Gray, Syn. Fl. l. c.—Widely dispersed in northern North America, but nowhere a common plant, unless it is so in the subarctic regions.

10. P. HUMILE, Willd. in Rœm. & Sch. Syst. iv. 792; Gray Syn. Fl. l. c. excl. var.; *P. Richardsonii*, Graham in Bot. Mag. t. 2800.—Arctic coasts and islands, both Asiatic and American, the name probably covering several species, as it is applied in most of the books.

11. P. VISCOSUM, Nutt. Pl. Gamb. 154, in part only, fide Gray; Gray, Syn. Fl. l. c.—Inhabiting the northern Rocky Mountain region; leaflets crowded or sometimes imbricated, as in the species of the next group, and perhaps even including

P. confertum as a form with longer corolla. This appears to have been Nuttall's opinion who collected the two, and whose field experience of the easy variability of the corollas in West American Polemoniaceous plants may have warranted such a view of this plant and the next.

** * * Root perennial; leaflets imbricated, simple or 2-parted: carolla narrowly funnelform, the tube exceeding the limb.*

+ Stamens adnate to the middle of the tube, or higher. slightly or not at all declined; flowers blue, varying to white.

12. P. CONFERTUM. Gray. Proc. Acad. Philad. 1863. 73: Bot. Cal. i. 500; Syn. Fl. l. c.—One of the most common and beautiful plants of the highest mountains throughout the whole western country. The named variety *mellitum* is simply a better development of the plant in sheltered situations. or at somewhat lower altitudes. The type is the more common state and is found on the coldest and bleakest summits.

+ + Stamens adnate almost wholly, hence not susceptible of being declined: corolla yellow, the limb more spreading than in the last, tube still narrower.

13. P. BRANDEGEI = *Gilia Brandegei*, Gray, Proc. Am. Acad. xi. 85; Syn. Fl. l. c. 149.

COLLOMIA.

Nuttall, Genera N. Am. Pl. i. 126; Lindl. Bot. Reg. xiv: Benth. in Bot. Reg. xix. excl. sp. and in DC. Prodr. ix. 307. excl. sp.; Gray, Proc. Am. Acad. viii. 258. in part, and Bot. Cal. and Syn. Fl. N. Am. with like exceptions.

Calyx scarious below between the angles, accrescent, obpyramidal or nearly cyathiform, not distended by the capsule; segments herbaceous, equal, entire, triangular or lanceolate, erect, never recurved or even spreading, the sinuses at length enlarged below into a manifest revolute lobe. Corolla tubular-funnelform, with open throat and a spreading limb of short obtuse lobes. Stamens unequal and unequally inserted on the tube of the corolla, straight in the annual species, declined in the perennial. Capsule narrowed at base. Seeds usually 1 in each cell, in the typical, *i. e.*, annual species, mucilaginous when wetted, and emitting spiricles.—Herbs with alternate mostly entire leaves.

* *Perennial species, not typical, the stamens exerted and declined.*

1. C. DEBILIS = *Gilia debilis*, Watson, Am. Nat. viii. 302; Gray, Syn. Fl. l. c. 146: *Gilia Larseni*, Gray, Proc. Am. Acad. xi. 84; Bot. Cal. i. 497; Syn. Fl. l. c. 146.—Lower leaves either pinnately or pedately 5—7-parted, the upper 3-cleft or entire.—From Arizona and Utah to Washington Territory, in volcanic soil, the depressed and leafy flowering stems from creeping rootstocks.

* * *Annuals with strict and simple stem and flowers in capitate-crowded terminal leafy clusters; typical species, the leaves all entire.*

2. C. GRANDIFLORA, Dougl. in Bot. Reg. xiv. t. 1174: Benth. in DC. Prodr. ix. 308; Gray, Syn. Fl. l. c. 135.—California and Nevada and northward; a handsome species with showy salmon-colored flowers. In cultivation, short branches bearing flower-clusters are commonly developed in the axils, especially the upper; and this also occurs in the wild plant, but less frequently; the ordinary state exhibiting a strict and simple stem with one terminal bunch of flowers. The same is true of the next.

Issued November 25, 1887.

3. C. LINEARIS, Nutt. Gen. i. 126: Lindl. Bot. Reg. t. 1166: Gray, Syn. Fl. l. c. excl. var.—Rocky Mountain region from Colorado northward; corollas small, pale purple, insignificant compared with those of the preceding. The plate in the Botanical Register, executed from a specimen cultivated in England, represents an unnaturally lax and branching state, unlike anything ever seen in the wild plant.

* * * *Annuals branched from the base.*

+ *Branches depressed; flowers in nearly or quite bractless small clusters, in the axils, and at the ends of the branches.*

4. C. HETEROPHYLLA, Hook. Bot. Mag. t. 2895; Bot. Reg. t. 1347; Gray, Syn. Fl. l. c.: *Gilia Sessei*, Don, Gray, Proc. Am. Acad. xvii. 223: *Gilia heterophylla*, Dougl. in Bot. Mag. t. 2895; Gray, Syn. Fl. Suppl. 408: *Navarretia heterophylla*, Benth. in DC. l. c.—California and northward to British Columbia: the only annual species with leaves either cleft into lobes, or being aristate-tipped; by the last named peculiarity related to *Navarretia*: but a true *Collomia* in all essential points, the gibbosities in the sinuses of the calyx coming out strongly in age.

5. C. DIVERSIFOLIA. Near the preceding, but shorter and much stouter, the rigid almost divaricate branches naked below, bearing the rather large flower-clusters at or near the ends only: hirsute-pubescent, the inflorescence viscid: lowest leaves an inch long or more, spatulate, toothed near the apex or more commonly entire; the floral linear-lanceolate, entire, sessile: fruiting calyx a half inch long or more, narrow as to expansion, the lanceolate segments twice as long as the tube, firmly herbaceous throughout, not at all aristate-pointed, the gibbosities between them small for the size of the calyx, but very distinct.

Collected along Epperson's Road, in the mountains of Colusa County, California, June, 1884, by Mrs. Curran. The

specimens are in fruit only, and the smaller ones without branches look like *Githopsis*, so conspicuous are the large, deeply cleft calyces. That the corolla is unknown is a matter of small importance.

+ + *Branches ascending; flowers bractless and few or solitary in all the axils.*

6. C. TINCTORIA, Kellogg, Proc. Cal. Acad. iii. 17. t. 2; *C. linearis*. var. *subulata*, Gray, l. c. in part; *C. tenella*, Gray, l. c. in part, *i. e.*, the plant of eastern California and adjacent Nevada; *Gilia aristella*, Gray, Syn. Fl. Suppl. 408.—A somewhat variable species, badly confused with the next, in the first edition of the Synoptical Flora, but correctly defined in the Supplement. It is distinguished by its long aristate-pointed calyx-teeth and greatly elongated almost salverform corolla, the attenuate tube of which is deep bluish purple, the limb clear white. The flowers are, in some plants 3—5 in all, even the upper axils, in others 2 in the lower and 1 only in all the rest. It certainly includes most, if not all, of what Dr. Gray has called *C. linearis*, var. *subulata*.

7. C. TENELLA, Gray, Proc. Am. Acad. viii. 259: *Gilia leptotes*, Gray, l. c.—Said by Dr. Gray to have been collected only by Mr. Watson, in Parley's Park in the mountains of Utah, but there are specimens from Marcus Jones in the herbarium of the California Academy, labelled City Creek Cañon, Utah, July, 1880. The flowers are all solitary, and the species is well distinguished from the preceding by its broadly triangular barely acute calyx-teeth which are shorter than the tube, and by the small short-tubed corolla. The replication of the sinuses is as pronounced in these last two species as in any of the more typical, but their habit is not quite that of the other groups.

NAVARRETIA.

Ruiz & Pavon, Prodr. Fl. Per. et Chil. 20 (1794): Benth. in DC. Prodr. ix. 309. excl. *N. heterophylla* (1845): *Ægochloa*, Benth. in Bot. Reg. sub. t. 1622 (1838): *Gilia* § *Navarretia*, Endl. Gen. 3821; Gray, Proc. Am. Acad. viii. 263, Bot. Cal. i. 493, Syn. Fl. ii. part 2. 823.

Calyx-tube scarious between the 5 prominent green angles or costæ, not accrescent, prismatical or obpyramidal; segments unequal, erect or spreading, not recurved, pungent-tipped, all entire or the two larger spinulose-toothed or -cleft. Corolla tubular-funnelform or salverform. Stamens and style exserted or included, straight or declined. Pericarp 1—3-celled, 1—many-seeded, partially dehiscent from above, or from below. or indehiscent.—Annuals, glabrous and scentless, or viscid-pubescent and heavy-scented; the leaves always alternate, even the lowest, and setaceously or spinosely pinnatifid, or the lowest subentire; flowers in crowded bracted clusters at the ends of all the branches.

* *Pericarp hyaline and indehiscent, the walls closely adherent to and transparently exhibiting the agglutinated mass of dark-colored mucilaginous seeds.*

1. N. INVOLUCRATA, Ruiz & Pav. Fl.Per. et Chil. ii. 8.—South American, type of the genus, and analogue of the next species.

2. N. PROSTRATA. Primary flower-cluster sessile near the ground, the few branches radiating from beneath it and prostrate: leaves pinnatifid, the rachis broad and strap-shaped, the segments short and spreading, some of the uppermost occasionly 3-cleft: calyx-tube minutely white-hirsute, thin-hyaline between the stout costæ, constricted over the capsule, the segments spreading, 3 spinulosely trifid, 2 subulate and entire: pericarp a transparent utricle close fitted to the

glutinous seeds, breaking transversely, or irregularly when soaked.—*Gilia prostrata*, Gray, Proc. Am. Acad. xvii. 223; Syn. Fl. Suppl. 409.

Plains and valleys of the interior of California, from Los Angeles northward to the lower Sacramento: so near the South American type of the genus, namely, *N. involucrata*, Ruiz & Pavon, that there is little to distinguish it except the broad foliaceous rachis and short rather stiff segments of the leaves. The fruit of the South American *N. involucrata* appears to be much the same, although in that the segments of the calyx are less unequal and all five of them trifid.

3. N. LEUCOCEPHALA, Benth. Pl. Hartw. 324; *Gilia leucocephala*, Gray, Proc. Am. Acad. viii. 269. Syn. Fl. ii. part 1. 142.—Erect, a span high or more, the stem whitish puberulent: leaves once or twice pinnatifid, the rachis not broader than the divaricate segments: calyx-tube nearly glabrous without: white-hairy in the sinuses, little constricted over the capsule, the segments erect, all entire, or one or two of them cleft: corollas larger than in the preceding.

4. N. MINIMA, Nutt. Pl. Gamb. 160: *Gilia minima*, Gray, ll. cc.—A diminutive plant, commonly an inch or two high only: leaves with fewer divisions and much more rigid than in any of the foregoing: corollas minute, hardly exceeding the calyx-segments: calyx-tube exceeding the hyaline pericarp which, in the typical plant of Washington Territory is 1—2-seeded, in specimens from nearer the Mexican border (where it seems to be confluent with *N. prostrata*) 3-celled and 5—6-seeded.

5. N. INTERTEXTA, Hook. Fl. Bor. Am. ii. 75; Benth. in DC. l. c.: *Gilia interterta*, Steudel, Nom. i. 683; Gray, ll. cc.. *Ægochloa interterta*, Benth. in Bot. Reg. l. c.—From a few inches to nearly a foot high: calyx-tube and bases of the subtending bracts densely white-villous: capsule included, short and somewhat globose, invariably 3-celled and several-

seeded. but the walls hyaline, adherent to the seeds and breaking irregularly, not by the sutural lines which are apparent but do not become lines of actual dehiscence.

** * Capsule of firm texture, opaque, more or less perfectly dehiscent; seeds not agglutinate in a mass.*

+– Leaves glabrous, setaceously multifid, but soft and innocuous; only the floral bracts pungent; herbage scentless.

6. N. COTULÆFOLIA. Hook. & Arn. Bot. Beech. 368; Benth. in DC. l. c.: *Ægochloa cotulæfolia*, Benth. in Bot. Reg. l. c.: *Gilia cotulæfolia*. Stendel, l. c.; Gray, ll. cc. excl. N. *pubescens*.—The flowers in this well marked species are tetramerous and the four segments of the calyx are all entire. two of them being of twice the size of the others. The corollas are white and the stamens well exserted. The species is common on the plains of the lower valley of the Sacramento, particularly about Suisun. I have also a specimen from Mr. Hickman. obtained by him near Gilroy, south of the Bay of San Francisco. The foliage is sufficiently like that of *Anthemis Cotula* in aspect. but is wholly scentless. The ascribing to it the odor of the composite thus named has come of the confusing of this plant with the very different *N. pubescens*. which latter is a hundred fold more common and well known.

7. N. NIGELLÆFORMIS. Habit of the last, the foliage somewhat firmer but not pungent: flower-clusters conspicuously involucrate, the bracts broad and setaceously multifid: 5-merous: 2 larger calyx-segments aristate-pinnatifid, other 3 with pungent teeth: corolla deep yellow, the funnelform throat with 5 purple or crimson spots: fruit unknown.

Near Visalia, Tulare Co., California, April, 1886. Dr. T. J. Patterson. A very beautiful species, the large bright green and glabrous multifid bracts giving the effect of those which subtend the flower of *Nigella damascena*.

++ Leaves filiform and simple, or else pinnatifid or multifid. the segments rigid and with pungent tips; herbage viscid-pubescent, and fragrant or ill-scented in most species.

8. N. VISCIDULA, Benth. Pl. Hartw. 325: *Gilia viscidula*. Gray, ll. cc.—A few inches high and rather stout: leaves slender but firm, serrate-pinnatifid or parted into setaceous lobes, the bracts ovate-dilated: capsule normal, 3—6-seeded.

Hill country of middle and southern California: in the lower Sacramento region, hybridizing freely with the next.

9. N. PUBESCENS, Hook. & Arn. Bot. Beech. 368: Benth. in DC. Prodr. l. c.: *Ægochloa pubescens*. Benth. in Bot. Reg. l. c.: *Gilia pubescens*. Steudel. l. c. 684: *Gilia cotulæfolia*. Gray, l. c. in part.—Less robust than the last, taller, flexuous and branching, soft-pubescent: leaf-segments 5—11, the terminal or odd one spatulate-dilated, the others linear, all with numerous sharp and stiff teeth or lobes: calyx-teeth all pungent-tipped, 3 small and entire, 2 twice as large and toothed: corolla deep blue or purple, ¾ inch long, the throat funnelform, stamens exserted: capsule 1-celled and 1-seeded!

Common in the hill country and chiefly in open places among oaks, not on the plains. Herbage with a disagreeable hircine odor, stronger than that of *Anthemis cotula*. There are hybrid forms of this with yellow, and even tetramerous corollas, and there is a good deal of variability in the species in regard to habit of growth; but its pubescence and the stiffness and pungency of the foliage everywhere mark it as distinct from *N. cotulæfolia*, to which Dr. Gray has referred it.

10. N. SQUARROSA, Hook. & Arn. l. c.: *Hoitzia squarrosa*. Eschscholtz in Mem. Acad. Petrop. 1826: *Ægochloa pungens*. Benth. in Bot. Reg. l. c.; *Gilia pungens*. Hook. Bot. Mag. t. 2977: *Navarretia pungens*. Hook. Fl. Bor. Am. ii. 75: *N. squarrosa*. Benth. in DC. Prodr. l. c. 310: *Gilia squarrosa*.

Gray, Proc. Am. Acad. l. c. and Syn. Fl. l. c.—The most common of all species, infesting fields and waysides everywhere; readily known by its extreme viscosity and strong mephitic odor. The corollas are not quite half as large as in the preceding, of a bright, or pale blue color, and exactly salverform.

11. N. MELLITA = *Gilia mellita*, Greene, Pittonia, i. 71 & 72.—Described in the place referred to from my own specimens obtained in San Mateo County. But there are, in the herbarium of the Academy, plenty of specimens from Marin County, collected by Mrs. Curran. It is doubtless a common species, much like a small form of the last, but readily known by the sweet odor of its viscous herbage, and by its very small and pale corollas. It is, moreover, six or eight weeks earlier in its flowering, and inhabits woody places, not fields and roadsides.

12. N. HETERODOXA = *Gilia heterodoxa*, Greene, Bull. Cal. Acad. i. 10: *G. viscidula*, var. *heterodoxa*, Gray, Syn. Fl. Suppl. 409.—Plant a foot high, the numerous slender branches forming a rounded bushy growth; herbage clammy-puberulent and aromatic; stem-leaves and floral bracts broad and nearly entire, except at base: calyx-teeth subequal, entire: corolla short, the limb open-campanulate, like that of a typical *Polemonium*, and the stamens are declined.

Hills near Calistoga: collected again, this year, by Dr. Parry.

13. N. PARVULA = *Gilia parvula*, Greene, Pittonia, i. 72.—Like a possible diminutive state of the preceding as to foliage, bracts, etc., but the corolla exactly funnelform, stamens all incurved in even their full development, 2 within the corolla, 3 exserted and declined.

14. N. FILICAULIS = *Gilia filicaulis*, Torr. in Gray, Proc. Am. Acad. viii. 270; Syn. Fl. ii. part 1. 142.—Like *N. heterodoxa* in size, habit, etc., only much more slender and scarcely

at all clammy: leaves linear-filiform, rigid, entire or with a few acerose segments toward the base: floral bracts subulate from a broad and more or less acerose-cleft base: segments of the calyx subequal, triangular subulate, entire: corolla slender, deep blue or purple: capsule imperfectly 2-celled, 4-valved, being both loculicidally and septicidally dehiscent, 4—8-seeded.

Lower and middle mountains of the central part of the State, east of the Sacramento and San Joaquin. The interesting character of the capsule appears in very mature specimens collected by the present writer at Colfax, September, 1883.

15. N. MITRACARPA. Size of the last but not so slender, depressed and diffuse, hirsute-pubescent, the inflorescence glandular; leaves rigid and pungent, with about 2 pairs of acerose 2-parted basal segments and a lanceolate acerose-toothed terminal one: bracts few and like the leaves: 2 segments of the calyx with a spinulose tooth on each side, 3 entire and shorter: corolla unknown: capsule dehiscent by 4 sutures from the base to near the middle, the indehiscent summit marked by a central apiculation and 4 prominent radiating lines, 1-celled, 1-seeded; seed attached to a mere placental intrusion of the base of one of the false valves, large, clavate-oblong, one side formed into an apparent excavation by an involution of the margin (as in some Phacelias) and showing a central ridge; testa when wetted developing a thick and dense gelatinous mass.

Obtained somewhere in Lake County, California, in the summer of 1884, by Mrs. Curran.

16. N. PROLIFERA. Erect-spreading, a span to a foot high, with rather large capitate flower-clusters and slender naked flagelliform branches radiating from beneath the earlier clusters, themselves ending each with an inflorescence, only the short and erect main stem leafy: leaves an inch long, glabrous, linear-filiform, entire or with one or two pairs of

segments at base, not at all pungent; the few which closely subtend the heads, more divided and somewhat pungent: calyx and bracts whitish with a viscid wool: calyx-tube entirely hyaline, longer than the longest of the teeth, the latter erect, entire, subulate: corolla nearly a half inch long, almost salverform, the purplish or blue limb a fourth of an inch broad, or more, the narrow throat yellow: stamens included, style far exserted and declined: capsule 3-celled, many-seeded.

Near Visalia, Tulare County, 1886, by Dr. T. J. Patterson; also in the same year, at Foster's Station, Amador County, by Mrs. Curran. A very well marked and handsome new species. The slender and wiry naked branches, bearing clusters of flowers in the axils and at the ends give the plant a peculiar aspect; although something like it is seen in larger states of *N. divaricata*.

17. N. DIVARICATA — *Gilia divaricata*, Torr. in Gray, Il. cc.—Closely allied to the preceding, but of different aspect, being small and diffuse, and the clusters crowded on the short branches: corolla minute, calyx-segments longer than the tube, from which latter the mature capsules protrude and remain invested by the persistent tube of the corolla. Common at the altitude of 6,000 or 7,000 feet in the Sierra Nevada, from Kern Co. (Mrs. Curran) northward through Oregon, etc. Mr. Somme sends us from Truckee a manifest hybrid between this and *N. minima*, both of which species are plentiful in his vicinity.

18. N. PENINSULARIS. Diffusely branching, 3—10 inches high, glandular-puberulent and very viscid: leaves all acerose-pinnatifid: flowers rather few, in numerous scattered and mostly pedunculate glomerules: calyx sparsely hirsute, the segments subulate, entire, very unequal, the shortest fully equalling the tube, the longest surpassed by the purplish corolla: capsule 3-celled, many-seeded.

Hanson's Ranch, in the northern part of Lower California,

July 10, 1884, C. R. Orcutt, No. 1113. Related to the last, but sufficiently distinguished by its clamminess and different inflorescence, as well as by its larger corollas.

19. N. Breweri — *Gilia Breweri*, Gray, ll. cc.—As small as *N. minima*, but of the present group, and distinguished from its allies by yellow corollas, and few-seeded capsules. Its range is from the middle Sierra Nevada of California, eastward to Utah and Wyoming.

20. N. subuligera. Stout and rigid, a span high, simple or paniculately branching, very minutely whitish-puberulent but not glandular: leaves pinnately parted, the segments subulate and rigid: bracts ovate-dilated and spinose-toothed: calyx-tube somewhat constricted above, the two principal segments equal entire, as long as the tube, the other three reduced to small pungent teeth: ovary with several ovules; capsules and seeds unknown: corolla slender, exceeding the calyx, apparently white.

Amador County, California, May 25, 1886, Mrs. Curran. The fruit of this, when known, may demand for it a place near *N. interlorta*. The constricted calyx, hairy in the sinuses, and the general aspect of the plant suggests this: but the foliage and bracts are more like those of *N. atractyloides*.

21. N. tagetina. Stems mostly strict and simple, rather stout, a foot or more high, and sparingly leafy: glabrous or nearly so, and wholly glandless: leaves pinnately parted into 7—9 linear segments which are spinulose-toothed or -pinnatifid: bracts acerose-multifid, very rigid, whitish-pubescent below: segments of calyx very unequal, the two larger pinnately, the 3 smaller somewhat palmately parted into rigid, acerose-filiform divisions: corolla very slender, $\frac{3}{4}$ inch long, seemingly white: ovary many-ovuled.

First collected by the writer, in Siskiyou Co., Cal., 1876; also near Folsom, July, 1883, Mrs. Curran. In foliage this species recalls the genus *Tagetes*.

22. N. ATRACTYLOIDES, Hook. & Arn. Bot. Beech. l. c.; *Ægochloa atractyloides*, Benth. Bot. Reg. l. c.: *Gilia atractyloides*, Steud. Nom. i. 683; Gray, l. c.—Stout and low, with short branches paniculately arranged: leaves ovate-lanceolate, rigidly coriaceous and in age reticulate, the margins beset with straight spinose-subulate teeth: segments of the calyx subulate, entire, erect, only moderately unequal: corolla narrowly funnelform, $\frac{3}{4}$ inch long, deep purple.

Very common from the Sacramento valley to San Diego. Herbage purplish or fuscous, viscid and heavy-scented. In the more northerly districts, where this species reaches the territory of *N. viscidula* and *N. pubescens* (both of them heavy-scented) it hybridizes with them to such a degree that one does not know to which species of the three most of the specimens should be referred; and when these mongrel forms first began to come into our herbarium a few years ago, we named them, in manuscript, as a new species. We have more lately learned their genealogy, and have seen acres of San Joaquin and Sacramento plains occupied by them, with seldom a patch of the pure breed of either species discoverable in that ground where they have met and commingled.

23. N. FOLIACEA. Near the last, but more diffuse and leafy, leaves ampler, less coriaceous and of a lighter green, their segments not wholly spinose, but herbaceous below; segments of the calyx very unequal, 2 large, ovate-acuminate, spinose-tipped and more or less recurved, 3 very small and only broadly subulate: corolla white, small, little surpassing the calyx: herbage scentless.

Common at San Diego, according to Orcutt: also at Potrero, in the mountains eastward, June, 1884, D. Cleveland. Distinct, entirely so, from *N. atractyloides* with which it was confounded by the author of the Synoptical Flora. Not hybridizing with it even; and, being scentless, it indicates that chemical qualities (such as the eye cannot detect) may

constitute the most impassable line of separation between species morphologically much alike.

24. N. HAMATA. Also near *N. atractyloides*, and like it aromatic, but smaller and comparatively slender; leaves not foliaceous-dilated, but with a linear, or nearly linear rachis and few or many spinose-subulate segments of which the terminal one, and sometimes one or all of the lateral pairs are strongly recurved or else abruptly deflexed (forming hooks); calyx-segments all subulate and spinose-tipped, all erect, 2 twice as large as the others: corolla salverform, deep purple, large for the plant, the slender tube well exserted from the calyx.

Gaudalupe Mountain, Lower California, June, 1883, C. R. Orcutt. Also at All Saints' Bay, May, 1885, by the present writer.

NEW OR NOTEWORTHY SPECIES.

SIDALCEA HICKMANI. Root perennial, woody-fibrous, not tuberous-thickened: stems numerous, erect, 2—3 feet high, leafy throughout: pubescence stellate-hirsute, short but abundant: lowest leaves small, roundish, with shallow crenate lobes, all the others larger, an inch long, exactly flabelliform, the semicircular upper border coarsely and irregularly toothed, the petiole rather longer than the blade: racemes numerous, axillary and terminal, pedunculate, few-flowered and a little flexuous: pedicels short, bearing 3 filiform bracteoles a half inch long: calyx ½ inch long, cleft below the middle, the segments oblong-ovate, acuminate: corolla an inch broad and long, rose purple: fruit much depressed, the carpels nearly orbicular, glabrous and with a few scattered transverse rugosities which are prominent along the edges but do not reach the somewhat depressed midvein.

In Reliz Cañon, back from the Salinas valley, Monterey Co., Cal., 1886 and 1887, Mr. J. B. Hickman.

A most remarkable plant, being a true *Sidalcea* with the habit of the suffrutescent species of *Malrastrum*, and the pubescence and inflorescence of the annual members of its own genus. The specimen showing the perennial root is evidently a young plant, and I have little doubt that in age the species is half-shrubby.

Clarkia Saxeana. A foot or two high, glabrous: leaves lanceolate, entire, short-petioled: calyx-tube slender, more than an inch long, abruptly ovate-dilated at base: petals large, round-obcordate, with a cuneate-obovate middle lobe proceeding from the shallow sinus and far exceeding the others: stamens 4, surpassing the corolla, the filaments strongly clavate: anthers oblong-linear, densely white-villous along the lines of dehiscence, erect, not recurved after shedding their pollen: capsule an inch long, stout, sessile, curving away from the stem; seeds large, tuberculate and conspicuously winged, the whole outline linear-oblong.

Obtained near the Geysers, in Napa County, Cal., in the year 1872, by Dr. A. W. Saxe of Santa Clara; subsequently cultivated by him for a number of years; here described from the wild specimens kept in the California Academy herbarium and labelled "*Eucharidium Breweri.*" A very strongly characterized species, in its petals which are nearly without a claw, and their rounded obcordate main part greatly surpassed by a long and conspicuous middle lobe, and in its stamens, for these latter remain straight and erect in age, while in all the other species they are recurved into a ring immediately after bursting. The plant is, of course, an *Eucharidium*, a purely artificial genus which, it is to be hoped, American botanists will not longer try to sustain by authority. The other species are as follows:

C. concinna = *Eucharidium concinnum*, Fisch. & Mey. Sem. Hort. Petrop. ii. 11; Lindl. Bot. Reg. xxiii. t. 1962; Brew. & Wats. Bot. Cal. i. 232.

C. Brewerı — *Eucharidium Breweri*, Gray, Proc. Am. Acad. vi. 532; Brew. & Wats. l. c. This rare plant does not appear to have been found again since the days of its discovery by Prof. Brewer.

Carpenteria Californica. Since the publication of pages 67 and 68 preceding, one friend has called to my notice the fact that the Botanical Magazine for last year gave an excellent figure of *Carpenteria* as it has flowered in England; and another has assured me that the shrubs are advertised for sale by an horticultural firm in Philadelphia; so that the plant is less rare than I had supposed.

Cuphea mesochloa — *Cuphea viridosloma*, S. Watson, Proc. Am. Acad. xxii. 412.—Now and then a name gets made which, it may be assumed, not even priority can save; and *viridosloma* must be relegated to that class, I think. It is incapable of any grammatical correction which will not alter its form beyond recognition as the same name. Or will the eminent critic who last year allowed *Calyptridium quadripetalum* to pass, tell us that *viridis* has even "a precarious lodgment"[1] in the Greek lexicon, or *stoma* in the Latin?

Phlox gracilis — *Gilia gracilis*, Hook. Bot. Mag. t. 2924: *Collomia gracilis*, Dougl. in Hook. l. c.; Benth. in Bot. Reg. t. 1622; Gray, Syn. Fl. 135.—This interesting plant came to the knowledge of botanists some years in advance of *Phlox Drummondii* and its allies. It was, at the first, a thing of dubious aspect, not at home in either *Gilia* or *Collomia*. But since the discovery of the Texan group of annual species of *Phlox* with peculiar habit, it must have been the mere force of custom which has kept men from seeing that it is an absolutely perfect congener of *Phlox Drummondii*.

Phacelia nemoralis. Biennial, or sometimes perennial, 2—4 feet high, loosely branching, hispid throughout and desti-

[1] A. Gray, Proc. Am. Acad. xxii. 284.

tute of canescent pubescence: leaves mostly simple, entire, ovate-oblong, petiolate, rugose and without conspicuous parallel veins; racemes geminate or ternate, short and spreading, slender but not loose: corolla small, greenish yellow: genitalia exserted: fruiting calyx round ovate or nearly globose, *i. e.*, the oblanceolate sepals spreading away from the capsule below, connivent over it above: seeds 2 only (the other 2 ovules always abortive), ovate, acutish, ¾ line long, deeply pitted, dark brown.

Common in the hills behind Oakland and Berkeley, Cal., also in the Sierra Nevada, inhabiting stream banks and northward slopes, always in shaded and moist places. Long known to me and to Californian botanists generally as thoroughly distinct from the other plant which, rightly or wrongly, goes by the name of *P. circinata*, but formerly withheld from publication because means were not then at hand for determining whether it might not be the *P. Californica* of Chamisso. But that is the cespitose perennial, common on open hills and plains, with stout and simple stems ending in a thyrsus of crowded racemes; canescent with an appressed pubescence, especially along the obviously parallel leaf-veins beneath; the leaves being also usually pinnately parted and not rugose; the flowers purplish and much larger than in the present plant; calyx never globosely surrounding the capsules; seeds lanceolate and one only (!) in each capsule. I have no doubt this, too, is distinct from the original Patagonian *P. circinata*, and to be taken up under the name imposed by Chamisso.

ALLOCARYA SCRIPTA. Stoutish and rather succulent, strigose-pubescent; branches prostrate, 6—10 inches long, loosely racemose, the short stout pedicels axillary to leafy bracts, deflexed in fruit: sepals oblanceolate, accrescent and at length standing vertically in a row: nutlets a line long, deltoid-ovate, acute, strongly carinate ventrally down to the broad basal scar, the back dark and smooth, marked by sharp irregular flexuous white rugosities and ridge, these everywhere beset with tufts

of short spreading bristles, which are distinct, or joined at base.

Obtained somewhere on the plains of the Sacramento, Cal., April, 1887, by Dr. C. C. Parry. Like *A. humistrata* (page 16 preceding) in habit, but much more pubescent and with widely different nutlets, their curiously traced rugosities suggesting the specific name.

Echinocystis § Megarrhiza.

II.

The limitation of genera is largely a matter of individual opinion. We have expressed heretofore our view of the limits of *Echinocystis*, and have given our reasons. If we had been answered to by other reasons, as we have not, we should still have no more to say upon that aspect of the present case; recognizing, as we do, the right of every botanist to have, to express, and to carry out his own opinions in such matters, with the fullest freedom. But there is one kind of liberty which is granted to none of us, and that is, to take for our genera whatever names suit our fancy.

Separate or combine plants generically as we will, or as we think we must, we are bound to take for our genus the first name that happens to have been given to it; it may not be the fittest or the most euphonious of the several which may have been employed; it may not have been framed and applied by the most eminent of scholars; but if it is the first in history, that is the name our genus must bear. The principle is a fundamental one in botanical bibliography.

I may at some future day be brought to share the views of Dr. Sereno Watson, regarding the proper generical status of those Pacific American cucurbits about which he and I, and some older and better botanists than either of us, have written somewhat. Were he and I to-day of one mind upon the subject, it would not be left to him to select one name for these

plants, and to me to select another. Were this freedom conceded to us two, it would have to be granted to every other living botanist, and so our genus might receive, next year, as many names as there might be botanists ready to add a species to it, or write a monograph of it. What is demanded of each and all of us is, that we search the printed records of our science, and find the earliest unpreoccupied name which the genus received from a botanist. That *Mara* is, in this case, the oldest name, Dr. Watson[1] has not denied; but he has not passed it by without throwing a kind of doubt upon it. He will have his readers think that it was not duly published, as regards place. He says the publication was "made in the columns of a daily newspaper." This statement, whatever it might be worth if it were fact, is fancy. The publication of *Mara* was not made in a daily newspaper. When Dr. Watson ascertains the circumstances of that publication, he should do all concerned the justice of telling his readers the whole truth about it, and retracting what he has written in the place cited. Since the name *Megarrhiza* was some years latter in making an appearance of any kind, there was no need of discussing it; and by attempting to discuss it, our writer has committed the second time on the same page the error of placing a fiction before us scientific people who are assumed to deal in facts. We are told about Dr. Torrey's "publishing a species (*M. Californica*) in Park's Report in 1856." Does Dr. Watson wish to say that the printing of a mere name is publishing a species? Evidently he is writing for people who do not know just what these familiar phrases mean. To print a name of a genus or a species is one thing. To publish a genus or a species is quite another. The former is all that Dr. Torrey ever did with the name *Megarrhiza*. The publishing of the genus, under that second, and hence uncalled for name, can be credited to no one but Mr. Watson, as I have elsewhere indicated. Dr. Torrey once thought to do the

[1] Bulletin of the Torrey Botanical Club, Aug., 1887.

thing, but, as Dr. Watson has acknowledged, refused to do so when he learned that the genus had a name already.

Two reasons only, not based in fancy, seem to be given us by our author, for standing by the name *Megarrhiza*. One is that he himself once before in his life took it up and named species under it. Referring to that earlier day he says: "I had no hesitation in adopting Dr. Torrey's name for the genus." The known priority of *Mara* did not then stand in his way; and now he has his own former action for a precedent. But a man so true to principles of scientific justice as Dr. Torrey, had hesitated, and not only hesitated, he had ignored the name, although of his own making, and steadily refused to publish a genus or a species under it, from the day that he became aware that, as a name it was precluded by an earlier. He would not attempt to place himself superior to the first law of generical nomenclature; and it seems hardly to argue much veneration for Dr. Torrey's memory, to force him now, into an attitude which, living, he would not assume.

Dr. Watson's second reason, to give it in his own words is this: "The genus *Megarrhiza* was recognized by Dr. Gray in 1859." The name and description of the genus *Mara* had then been some five years before the botanical public. Is it, then, in Cambridge, Massachusetts, Dr. Gray's recognition, and not historic fact, which determines the names of genera? That is what we had long been compelled to think; but we had hesitated to speak our thought. Dr. Watson has now spoken it for us.

Biographical Notice of Dr. Albert Kellogg.

Albert Kellogg, M. D., the first botanist who became a resident of California, died at the home of his friend, Mr. W. G. W. Harford, in the town of Alameda, near San Francisco, on

the thirty-first of March. 1887, in the seventy-fourth year of his age; having been born at New Hartford, Connecticut. on the sixth of December, 1813.

Herborizing is reported to have been a passion with him. almost from childhood; and his parents, farmer people in comfortable circumstances, judged, agreeably to rural ideas of the healing art then prevalent, that training with a view to the medical profession was indicated for a boy whose chosen pastime was that of filling the farm house attic with herb bundles. making it a store room of simples from which, it is said, the neighborhood around were wont to draw freely whenever real or fancied remedial agents were in request.

He does not appear to have received any literary training beyond that afforded by the village common schools; but in early youth he was placed with an eminent physician of Middletown, Connecticut, to begin medical studies. Pursuing these with commendable zeal, his health failed, and he returned to the farm, where, resuming work in the field, and recreation in the woods, the threatenings of pulmonary disease disappeared, but to return again as often as he went back to indoor life and books; and being advised to try, as a last hope of recovery, the effect of a milder climate than that of New England, he went to Charleston, South Carolina, where he became a student in the medical college of that city. His degree in medicine was taken some years subsequently, at the college in Lexington, Kentucky; for he had early been compelled, by the return of serious pulmonary trouble, to exchange the climate of the sea board town for that of the interior.

He practiced his profession for a number of years, in various parts of Kentucky, Georgia and Alabama, with success in all but what appertained to his own needs. He was careful to enter in his books, the account of every fee due him, and as careful (or careless) never to present a bill. It was the opinion of one who knew him in those days, that he did not once, in all his career as a physician, request a payment. Naturally, he failed to obtain in medicine the means of subsistence, and abandoned the profession. The turning point of his life, in

this respect, was the pleasant event of his meeting, as he did somewhere in the south, with Audubon, the famous ornithologist, who desired his help and his companionship in what must have been the most alluring of all prospects to Dr. Kellogg, an extended tour southwestward, exploring regions new and unknown to both. During his few years of professional life he had continued, as in boyhood and youth, to spend all his spare time in field and woodland rambles and observations. And we who know something of his zeal, his love of nature, his virtues of simplicity, humility, patience and cheerful readiness to do all kinds of work, involved in scientific travel on American frontier lands, are certain that Audubon had, in him, both an agreeable and a serviceable companion. This journey landed our botanist eventually in San Antonio, Texas, in the autumn of 1845.

Returning from Texas to his native State, he appears soon to have been upon his way to other and new fields of study, in Ohio and other parts of the Mississippi river region. There is uncertainty about the length of time occupied in these new journeyings; but, at the time of the discovery of gold in California, he was again near the borders of his native New England, and, reaching home, he found himself a man of some well earned local fame for travel, and was sought out and desired to join a small party of voyagers to California. Prompted, as we may think, more by the naturalist's than by the gold seeker's impulses, he joined them; a schooner was bought and provisioned and sail was set. This company reached Sacramento, by way of the Straits of Magellan, as early as the eighth of August, 1849. Landings had been made on Tierra del Fuego, and at several points along the southern coasts of South America, and the botanist had eagerly availed himself of every opportunity for collecting plant specimens. This collection which would in after years have been of individual interest, as well as of scientific value, perished by a flood at Sacramento, not long after the arrival.

After three or four years at Sacramento and in the mining districts above that place, Dr. Kellogg took up his residence in San Francisco, exerting himself from the first to procure

an organization for the advancement of science in the young metropolis. He was one of the original seven, and the last survivor of them, who, in April, 1854, organized the California Academy of Sciences; and from that time to the end of his life he was actively connected with it. To him the Academy is indebted for the early beginnings of its herbarium and botanical library. He took occasional trips into various parts of the State, collecting, making drawings of plants new or rare, and publishing a few species in the Proceedings of the Academy; also contributing more or less to the horticultural and agricultural departments of several of the early papers and magazines that were published in San Francisco. In 1867 he was appointed surgeon and botanist to an expedition which, under charge of Professor Davidson of the U. S. Coast Survey, made a summer's exploration of the shores of Alaska and some of the neighboring islands. The botanical collection numbered, I think, several hundred species. The specimens were good; but only three sets were made, one of which went to the Smithsonian Institution, another to the herbarium of the Philadelphia Academy, the third being given to the California Academy. Two or three years later, being again with the Coast Survey party, he was on the island of Santa Cruz, but it was in the month of November, when little botanizing could be done, and only a few fragments in the way of specimens were secured and brought home from this island which has since proven a field of such unusual interest; but all these fragments represented species then new to science, although he did not recognize more than one of them as such; the others having been since published, and still more recently collected again by the present writer.

Dr. Kellogg would not have claimed for himself the place of a scientific botanist, nor have wished others to claim it for him. He had a great love for all forms of plant life, more particularly of trees; and he had a keen eye for detecting varietal and specific differences. He was fond of sketching them and writing about them; and when writing upon a species which he thought new to science (and, in his earlier years

of California life he met with many which scientific botanists knew nothing of), he liked to give it a Latin name and a formal description; but his terminology was somewhat original and his way of making Latin adjectives still more so, insomuch that grammarians have been obliged to correct the endings of many of them before giving them further currency.

A vein of religious feeling, which was deep in him, frequently obtained expression in his botanical writings. Trained by Wesleyan parents to daily reading of the Sacred Scriptures, his interest in them, and especially in the historical books of the Old Testament, deepened in after years, when he had learned to interpret them by the rules of Swedenborg, of whom he was an ardent disciple; and, as botanists in general have been wont to draw names, or at least the suggestions of them, largely from Greek and Roman mythology, Dr. Kellogg in more than one instance drew them from the Hebrew classics with which he was so familiar. Perhaps not even the English name of Abram's Oak which he proposed for his "*Quercus Morehus*" has failed to give a clew to the enigma of that specific name. It is the Doctor's Latinization of Moreh, where the great patriarch of Bible fame once dwelt. The Report on the Forests of California, a paper of more than a hundred octavo pages, published in 1882 as a Supplement to the Report of the State Mineralogist, exhibits well that commingling of matters poetical, theological and botanical which was characteristic. And this peculiar style of writing he indulged in without any confusion of fact and fancy in regard to scientific objects described. His botanical eye was keen and quick, and he was conscientiously exact in his descriptions, in so far as he had command of terms, and in his delineations. Everything which he has written can be relied upon, in so far as relates to the real aspects or characteristics of the bush or tree or weed or leaf or flower; and even his most rhapsodical productions, when they have a tree or a shrub for their text, deserve careful reading for the sake of the scientific facts recorded in them.

His name as a botanical writer is associated with a consider-

able number of the peculiar shrubs and trees of the California region, and also with some of the most beautiful of our indigenous Liliaceæ, including *Lilium Washingtonianum*, *L. pardalinum*, *L. parvum* and *L. maritimum*. It will also be connected prominently with the peculiar vegetation of Cedros Island, the exploration of which remote and interesting spot was begun by Dr. Andrew J. Veatch, one of Dr. Kellogg's early associates in the Academy, as long ago as 1859. Dr. Torrey, in recognition of his services to the botanical science early dedicated to him, under the name of *Kelloggia*, a Rubiaceous genus of the Sierra Nevada which has remained monotypical.

All who have known Dr. Kellogg will remember him as a man who, without asserting any claims to rank as a great botanist, was nevertheless one of the most ardent lovers of plant life, especially of those forms of it which make the forest, grove and thicket. His admiration for trees was unbounded; and I have it from the lips of one who was of the party in whose company he first beheld the giant Sequoias, that on the first near view of these primeval wonders of the California forest, he stopped, trembling with emotion, then walked on and paused again and looked, and, last of all the company, reached the shade with tears still rolling down his face, so deeply was he moved by the sublime presence of these surviving monuments of a botanical age long dead.

He will also be remembered as a man of singular purity and uprightness of character. Deeply pious, he abominated all hypocrisy and cant, and was free from any tinge of religious bigotry. Jews and Greeks, Catholics and Protestants were all one to him if sincere. And the moral uprightness of his nature was not at all of that easy and negative kind which can not disapprove of anything which is done in the world, and keeps silence to avoid disturbance. He was capable of indignation at injustice and wrong doing, and would so speak, at all hazards, rather than seem to give assent to that which he could not approve; and this without the least assumption of superior virtue, which is the mark of hypocrisy.

During the last ten years of his life he was at his table in the Academy, pretty constantly, day after day, at work with pencil and pen, making drawings of his favorites, the California trees and shrubs in leaf, flower and fruit. The amount of labor bestowed on each species was wonderful, and will be best understood when it is said that his practice was, to take first, with pencil and transparent paper, an exact outline of every leaf, showing each individual notch and vein and veinlet; and this being accomplished, the whole was done on suitable paper or board, in ink. Thus, at some sacrifice of natural grace, his later drawings are most minutely faithful to nature; and many of them are truly beautiful. Upwards of four hundred of these drawings, including all the oaks, all the coniferous trees, the poplars, many of the willows and ceanothi, dogwoods, and many herbaceous plants were left by him in charge of his friends, Dr. William P. Gibbons and Mr. Harford, to be disposed of as they might think best.

New Species from Mexico.

The following species, appearing to be new, form a part of a highly interesting collection made by Mr. A. Forrer, in the autumn of 1881, on the higher Sierra Madre back of the city of Durango, in Mexico, the locality having an altitude of about 8,100 feet.

Dalea cyanea. Perennial: stems tufted, a foot high, erect from a decumbent base, corymbosely branched at summit: herbage glabrous, glaucous and punctate: leaves an inch long or more, nearly sessile; leaflets in 5—6 pairs, 4—5 lines long, elliptical, obtuse, very shortly pedicelled: flowers crowded in roundish depressed heads: bracts broadly ovate, acuminate, nearly glabrous, shorter than the 1 line long villous-pubescent calyces: calyx-teeth triangular-lanceolate, shorter than the striate tube: corolla a half inch long; the conspicuous keel and wings bright blue, the short banner white.

Astragalus Daleæ. Perennial: stems slender, decumbent or nearly prostrate, a foot long or less: apparently glabrous, but minutely and sparingly puberulent under a lens: leaves 2 inches long, including the ½ inch petiole; leaflets in 9–12 pairs, 2—3 lines long, oblong, mostly truncate or retuse, very short-petioled: flowers greenish white, 2 lines long, 20—30 in elongated but crowded and spicate terminal and subterminal pedunculed racemes, deflexed in age; calyx campanulate, less than a line long, with minute triangular-subulate teeth: pod unknown.

Species no doubt related to *A. Cobrensis*, but, in inflorescence and general aspect, somewhat resembling species of *Dalea*.

SEDUM DIVERGENS. Annual, glabrous, 2—3 inches high, erect-spreading, with numerous divergent branches: leaves scattered, fleshy, 1—2 lines long, narrowly oval or oblong, obtuse, sessile by a broad base: flowers large (4 lines broad), solitary or in a divergent pair at the ends of the branches, white or faint rose-color; sepals lanceolate, half as long as the oblong-linear obtuse petals: fruit unknown.

HYPERICUM PARVULUM. Perennial: stems many, erect from a decumbent or somewhat creeping and stoloniferous base, 2—5 inches high: leaves spatulate-oblong, obtuse, 3—4 lines long: cymes open and few-flowered, the flowers a half inch broad: sepals oblong-lanceolate, herbaceous, equal: petals not punctate; stamens about 12 in 3 fascicles; styles 3, elongated: capsule short and roundish, barely equaling the sepals.

Plant recalling at once the Californian *H. anagalloides* and the Mexican *H. pauciflorum*, but very different from either.

RANUNCULUS FORRERI. Perennial from a fascicle of fleshy-fibrous roots, the whole plant canescent with an appressed silky-tomentose pubescence: leaves mostly radical, linear-oblong, 2—3 inches long, less than an inch broad, on petioles of an inch or more, conspicuously 3-veined, the margins entire, the apex formed of a large terminal and two smaller lateral teeth or lobes: stem erect, almost leafless, 3—7-flowered: calyx deciduous: petals 10, oblong with a nearly truncate apex, pale yellow: akenes orbicular, compressed, $\frac{1}{2}$ line wide, wrinkled along the sharp margin, tipped with a filiform straight style.

VALERIANA RHOMBOIDEA. Stem solitary, from a small oval tuber, erect, simple up to the dichotomous inflorescence, about a foot high, sparingly puberulent at the nodes, the plant otherwise glabrous: leaves an inch long, in about four pairs, the lowest obovate, attenuate to a petiole of nearly their own length, the upper rhomboid and sessile, all coarsely sinuate-

toothed: cymes 2, divergent on elongated naked peduncles, repeatedly dichotomous, compact in flower, perhaps loose in age; bracts slender, ciliolate-scabrous: corolla salverform, rose-colored.

ACHÆTOGERON FORRERI. Perennial: stem a foot or somewhat more in height, erect, simple, leafy and monocephalous, producing, from near the ground, two or three slender leafy stolons a few inches long: plant scabrous-puberulent throughout: leaves an inch long, linear-oblong, entire, obtuse, sessile and somewhat clasping: head $\frac{3}{4}$—$1\frac{1}{4}$ inches broad: bracts in more than one series, but all about equal: rays 50—70, apparently dull white with a purplish tinge: pappus in both ray- and disk-flowers nearly obsolete, consisting of a minute crown of short scales more or less joined at base.

GENTIANA (GENTIANELLA) SUPERBA. Proper stem only 1—3 inches high, bearing 1—3 erect scapose peduncles 10—12 inches long: plant glabrous and somewhat glaucous: leaves few, comprised in a radical whorl and 2—3 approximate pairs, the radical obovate-spatulate, obtuse, the cauline ovate-lanceolate, acutish, all 1—$1\frac{1}{2}$ inches long: peduncles stoutish, acutely angled: calyx $1\frac{1}{2}$ inches long, cleft below the middle, the 4 segments ovate-lanceolate, acuminate, carinate, nearly equal: corolla 2—$2\frac{1}{2}$ inches long, cleft below the middle, the spreading limb 2 inches broad; segments spatulate-oblong, deeply fringed down the sides, erose-dentate around the rather obtuse apex.

The Mexican species of the *Gentianella* group are difficult of definition, but the present plant is well marked in habit, and the broad corollas, if blue or purple (sadly faded in all the specimens), must render this the most showy of gentians. Most of the specimens are simple and 1-flowered.

LITHOSPERMUM TUBULIFLORUM. A foot high from a perennial root, sparingly pubescent with soft appressed hairs, the leaf-margins pilose toward the base: leaves an inch long, ses-

sile, clasping: corolla a half inch long, apparently orange-colored, hoary-pubescent outside, tubular-funelform, the small rounded lobes scarcely spreading.

Species related to *L. Cobrense* of New Mexico and Arizona. It is possible that, in the fresh flowers, the lobes of the corolla are not, as they seem in the dry specimen, erect.

VERBENA SUBULIGERA. Root perennial: stems numerous, procumbent, a foot or two long, hirsute-pubescent: leaves of ovate outline, pinnately parted, the lower and larger segments incisely lobed or coarsely toothed: spikes elongated and slender; bracts subulate, 3–4 lines long, squarrose-spreading: calyx little more than a line long: corolla minute, pale blue: nutlets $\frac{3}{4}$ line long, only faintly striate on the back, the scabrous commissure occupying about four-fifths the length of the nutlet.

Near *V. bracteosa*, with which it agrees well in habit; but the nutlets in that familiar species are a line long and have a sharply rugose back, and a commissure fully coextensive with the nutlet.

HEDEOMA JUCUNDA. Perennial: young parts puberulent: stems numerous, ascending, wiry and somewhat tortuous, a span high: leaves oblong or oval, entire, almost veinless, sessile, a half inch long: calyx-tube slender, orifice very gibbous, the two lower teeth slender, curved upwards, much longer than the broader and somewhat reflexed upper ones: corolla a half inch long, rose-purple, pubescent outside.

Related to *H. hyssopifolia*, and with more showy flowers; but in habit more like *H. thymifolia*.

SALVIA (CALOSPHACE) FORRERI. Annual, less than a foot high, the stem simple, leafy only below midway, peduncle conspicuously hirsute below the inflorescence, the plant otherwise glabrous: leaves deltoid or deltoid-ovate or slightly hastate-dilated at base, the very lowest often broadly rhomboid, less than an inch long, on petioles of a half inch, the

margin slightly but evenly crenate: clusters of only 2- 4 flowers, rather distant: lower lip of calyx bifid, upper entire, all the segments aristate-pointed, the whole calyx shorter than the throat of the more than a half inch long, broad and showy, deep blue-purple corolla.[1]

STACHYS VENULOSA. Stems many, from creeping rootstocks, erect and simple, barely a foot high, hispid along the angles when young, glabrate in age, internodes an inch or two long: leaves ovate-oblong, obtuse at both ends, crenate-toothed, glabrous below and nearly so above, thinnish, reticulate-venulose, an inch long, short-petioled; inflorescence leafy and interrupted: calyx with oblique orifice, the subulate aristate-pointed teeth more than half as long as the narrow tube, not surpassed by the tube of the rather large pale rose-purple corolla.

CEDRONELLA COCCINEA. Glabrous, or the inflorescence very minutely and sparingly puberulent: leaves ovate-lanceolate, coarsely crenate-toothed, 2 inches long including the $\frac{1}{2}$ inch petiole, pale or glaucous beneath: lower flower-clusters distant and axillary to broad leaves, uppermost more crowded and subtended by narrow bracts: calyx-teeth slender-subulate, half as long as the tube: corolla more than an inch long, light scarlet or with a tinge of yellow; styles and stamens well exserted.

Not much more of the plant was collected than its inflorescence. It is allied to *C. aurantiaca*, but has a very different calyx.

ZEBRINA (?) PUMILA. Glabrous, or nearly so: stem solitary, from a small horizontally elongated tuber, $\frac{3}{4}$–2 inches high:

[1] SALVIA (CALOSPHACE) ALIENA. Shrubby (?), young parts and lower face of leaves pale with a minute tomentum: leaves thin, deltoid-ovate, acuminate, coarsely and incisely toothed, more than an inch long, on petioles of a half inch or more: raceme loose, short-peduncled; clusters 6–10-flowered: calyx tubular, 3 lines long, 3-toothed, the teeth muti-

leaves mainly a terminal subopposite involucral pair, ovate-falcate, conduplicate, enfolding the 5—8-flowered umbel, one or two small cauline ones, when present, narrower. with a short sheath and a single flower in the axil : pedicels slender, a line long or more : calyx purplish and rather scarious, 2 lines long or more, narrowly elliptical, acute at base, parted to the base on one side, slightly cleft at apex on the other, the margins sparsely ciliolate : corolla deep rose-purple, the tube a half inch long, limb 6—8 lines broad, lower lobe obovate-reniform, as large as the two upper, which are narrower : stamens nearly equaling the corolla, filaments naked ; connectives of the anther capillary rather more than a half line long, only under a good magnifier appearing broader and flattened at summit, widely divergent or somewhat deflexed ; anther-cells orbicular.

This curious little plant must surely be a congener of the rare and little known *Tradescantia leiandra*, Torr.. which Mr. C. B. Clarke (DC. Monogr. iii. 318) has referred, with a doubt, to the Central American genus, *Zebrina*.

Calochortus venustulus. Bulb ovate, an inch long. near the surface of the ground : stem 6—10 inches high, slender, branching and flexuous, with a grassy leaf at each node, the solitary radical leaf broader but linear : pedunceles slender. equaling the leaves : flowers erect, open-campanulate or possibly nearly rotate, white or cream color : sepals narrowly oblong, 6—8 lines long, obtuse, mucronulate, colored like the petals and equaling them in length, glandless and with or without a small tuft of long hairs near the base : petals obovate-oblong, obtuse, naked above, the lower portion hairy in the middle and along the margin : gland not obvious.

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cous, acute or acuminate, the striæ hirsute : corolla deep blue, 8 lines long, the concave upper lip woolly outside. Brought, by an unknown collector, from Maria Madre, of the Tres Marias group of islands, off the coast of Mexico. The specimens are in the herbarium of the California Academy, the ticket indicating the above named locality, and bearing the date, April, 1877.

A peculiar species, with a little of the aspect of the Californian *C. lilacinus*, the sepals and petals more nearly alike than in any other member of the genus.

New or Noteworthy Species.

II.

Trifolium scabrellum. Annual, a foot or two high, with many decumbent branches; glabrous, except a minute and sparse scabrous pubescence on the involucres, peduncles and younger leaves and leafstalks: leaflets elliptic-oblanceolate, an inch or more in length, setaceously denticulate, the apex truncate, toothed like the margins and with a central cusp: peduncles slender, far exceeding the leaves: involucre laciniately multifid, the segments rigid and aristate-subulate: calyx nearly cylindrical, the subscarious and colorless tube striate-veined, nearly as long as the equal purple teeth which are entire, and subulate-aristiform from a broadly ovate base: corolla 5 lines long, banner light purple, wings dark, keel white.

Moist grounds on the plains near Visalia, California, March, 1886. Dr. T. J. Patterson. Allied to *T. tridentatum*, but quite distinct.

Saxifraga Marshallii. Caudex short, not bulbous: leaves on elongated flattened but scarcely dilated petioles, oval or oblong, obtuse, coarsely and evenly triangular-toothed, the base abruptly acute, or nearly truncate, or slightly rounded: scape naked, 8 inches high, minutely glandular-pubescent: calyx free from the ovary, the segments reflexed: petals 1½ lines long, narrowly oblong, acute, white with an oval green spot on each side of the midnerve toward the base: stamens

10, as long as the petals; filaments white, narrowly elavate. abruptly acuminate under the round red anthers.

An elegant species, with the vegetative characters, nearly. of *S. reflera*, but flowers more like those of *S. Mertensiana:* found on damp rocky hill-sides, Hoopa Valley, Humboldt County, California. in April, 1887, by my zealous correspondent, Mr. Carl C. Marshall, to whom I gladly dedicate it.

Potentilla daucifolia. Perennial: stems stout and rigid. more than a foot high, and. with the petioles, loosely pilose and rather densely glandular-pubescent: stipules divided into 6 or 8 narrowly linear segments almost an inch long: leaves pinnate, the leaflets, nearly an inch long, in 8—12 pairs, each 2—3-cleft or -parted into linear divergent segments: calyx spreading, parted to near the base, the segments ovate-acuminate, 2½ lines long, bracteoles lanceolate and nearly as long: petals spatulate-oblong, obtuse, little surpassing the calyx. cream-color: stamens 10; filaments short, petaloid-dilated: pistils 8—12: akenes a line long, obliquely pyriform, smooth and dark-colored.

Klamath and Shasta valleys in the extreme north of California; related to *P. congesta*, which inhabits the same region.

Rhamnus rubra, Greene.—Since the publication of this transmontane species (see page 68, *ante*) I have discovered that both its fruits and seeds are of a different form from those of the allied, and common, species of the Californian coast and middle regions. The berries of *R. Californica* are depressed-globose, and nearly twice as large as those of *R. rubra* which are somewhat pyriform. The seeds of the latter are, correspondingly to the form of the berry, distinctly narrowed at base, those of *R. Californica* not in the least so.

Cryptanthe Rattani. Pilose-hispid and slightly canescent. about a foot high, slender but rigid; leaves linear: spikes in threes on an elongated naked common pedunele, rather densely flowered, and in age strict: calyx appressed to the rachis.

its bristles spreading, not recurved, and straight to the very tips: nutlets (3 maturing) lanceolate-ovate, 1½ lines long. brownish and smooth, but dull, not shining, the closed ventral groove opening at the very base into a transverse areola.

This plant was first brought to me, from the hills near San Jose, California, by Mr. Rattan, and supposed by him to be a new species. I could then see nothing in it but a state of the common *C. flaccida* (*Eritrichium oxycaryum* of the Bot. Cal.) with larger corollas and more open and spreading habit, for the specimens were young and only beginning to flower. The botanist of Monterey County, Mr. Hickman, has more recently favored me with a plant in good fruit, revealing the excellent characters above given.

ALLOCARYA HIRTA. Annual, more than a foot high, erect and stoutish but flaccid, simple below, with many pairs of connate-sheathing linear leaves, loosely racemose above, setose-hirsute throughout with widely spreading or somewhat deflexed hairs and no appressed pubescence: racemes in pairs, bractless; pedicels slender, a line long, calyx 2 lines, not accrescent, the segments erect in fruit, very hirsute: corolla 3 lines wide: nutlets ovate, ¾ line long, dark colored, scarcely carinate except ventrally, the dorsal face granulate and obscurely rugulose.

Umpqua Valley, Oregon, 25 June, 1887, Thomas Howell: the specimens distributed as "*Krynitzkia Chorisiana*," which it is very far from being, and is more like *A. Scouleri*, differing from that not in character of nutlets, but in habit, pubescence, and the longer pedicels.

ARABIS PURPURASCENS, Howell in herb. Stems 1—2 feet high, tufted, from a perennial root, soft-pubescent with spreading simple or forked hairs, and a shorter more branching pubescence beneath: leaves scattered but rather ample, thin, green on both sides and with little pubescence, the lowest obovate-oblong, tapering to a petiole, the cauline narrowly oblong, sessile, all with scattered coarse and salient teeth:

Issued February 4, 1888.

racemes loose and few-flowered : calyx purple : corolla $\frac{3}{4}$ inch long, deep rose-purple : pod slender, 2 inches long, less than a line wide.

Rocky hill-sides, Ashland, Oregon, 26 April, 1887, Howell. A most beautiful species, having some resemblance to *A. blepharophylla* of the Californian coast.

CARDAMINE GEMMATA. Low, rather stout, glabrous, the root perennial, bearing large roundish tubers : radical leaf solitary, ternate, the leaflets broad, somewhat quadrate and coarsely toothed ; cauline 1—3, pinnately divided into 5—7 linear-oblong mucronate entire or toothed segments : raceme short, many-flowered : corolla 6—8 lines long, rose-purple.

Also collected by Mr. Howell, 20 April, 1887, along brooks near Waldo, Oregon. A much larger and handsomer species than its ally, *C. Nuttallii* (Greene, Bull. Cal. Acad. ii. 389). It bears, on Mr. Howell's tickets, and in his printed list, the name *Dentaria gemmata.*

SEDUM FORRERI must needs to be the name of what I have called, on page 154 preceding, *S. divergens*. The Oregonian *S. divergens*, Watson, published five or six years ago, had passed out of my memory.

POTENTILLA UTAHENSIS = *Iresia Utahensis*. Watson, Proc. Am. Acad. xvii. 371 (1882). This is unknown to me, and, in gathering together the scattered species for that partial revision which occupies some earlier pages of the present volume, this one escaped me.

ASTRAGALUS MAGDALENÆ = *Phaca candidissima*. Benth. Bot. Sulph. 13 (1844): *Astragalus candidissimus*. Watson, Bibliogr. Index, 191 (1878), not of Ledebour, Fl. Alt. iii. 309 (1829). Known as yet only from Magdalena Bay, Lower California, where it may be rediscovered, perhaps at no very distant day. It may well take this geographical name, its original one under *Phaca* being long preoccupied.

VISCAINOA GENICULATA = *Staphylea geniculata*, Kellogg, Proc. Cal. Acad. ii. 24 (1859). A low shrub with stoutish and rigid crooked branches: leaves alternate (but the peduncles opposite them), cuneate-obcordate, or cuneate-obovate and emarginate or retuse, with a very short petiole. firm-coriaceous, somewhat reticulate-veiny, minutely puberulent on both sides under a lens, an inch or more in length, the margin entire: peduncles stout, an inch or two long, 1—5-flowered: pedicels less than an inch long, stout and deflexed. slightly enlarged under the pods: pod an inch and a fourth in length including the stout beak-like persistent styles, strongly 4- (rarely 3- or 5-) lobed, inflated and of firm-coriaceous texture; the lobes, when mature, separating from the slightly coherent and columnar placentæ into narrow and deep cymbiform beaked valves which are exteriorly reticulate-venulose, carinate, and obscurely tomentulose, and of a shining satin-like smoothness within: seeds 2 in each cell, suspended almost or quite collaterally from near the summit of the column, oval in outline, 3 lines long, and with a small hemispherical white strophiole; testa dull and dark brown; embryo very small, at the base of a copious hard-cartilaginous or almost corneous albumen; cotyledons rounded, somewhat convolutely enfolding the short blunt radicle.

Concerning this rare and curious shrub of the Lower Californian peninsula no new knowledge is forthcoming beyond what has been gained by a minute and thorough examination of the good fruiting specimens, collected by Dr. Veatch almost thirty years ago, and now preserved in the herbarium of the California Academy of Science. It is plain, however, that it is neither a *Staphylea* nor a member of any otherwise known genus. With respect to its affinities, conjectures may profit little so long as the flowers remain unknown. The structure of the pod, and the merely external characteristics of the seed are suggestive of Buxaceæ, or Euphorbiaceæ, but the substance and conformation of the nucleus are against this view. I have, nevertheless, a suspicion that this and that other anomalous Lower Californian shrub, *Simmondsia*, are of one natural

family. The habitat is said to be sandy ravines near the seashore on the east or peninsular side (Cedros Island being opposite) of the Bay of Sebastian Viscaino. I have thought it well to dedicate the genus to the memory of that celebrated early Spanish discoverer whose name is permanently associated with the geography of the region.

CEDRONELLA RUPESTRIS. Shrubby, erect, slender, 1—3 feet high, with numerous divergent branches; pale-puberulent throughout, and closely puncticulate; leaves an inch long or more, almost sessile, narrowly lanceolate, entire, with a prominent midvein and an obscure nerve running parallel with it on either side: inflorescence terminal, also lateral at the ends of the branches, few-flowered and loose: calyx not colored, the teeth triangular, acute, one fourth the length of the tube: corolla an inch long, pale rose-color.—?*C. cana*, var. *lanceolata*, Gray, Syn. Fl. Supplement, 462.

Collected by myself at Mangos Springs, near Silver City, in the southern part of New Mexico, 1880, also at the same place later by Dr. Rusby. I assume, with a little doubt, that this is what the late Dr. Gray founded his variety upon. But it is a most distinct species, inhabiting rocky ledges, being shrubby, and of an altogether bushy habit and aspect.

TRITELEIA HENDERSONI. Leaves 2, 8—10 inches long, the solitary scape of scarcely more than equal length: pedicels 6—8, slender, 1—2 inches long: perianth funnelform, $\frac{3}{4}$ inch long, cleft to the middle, yellowish, with purple-veined and -tinged segments: filaments equal, joined to the entire length of the perianth-tube, free above and subulate-dilated, bearing the anthers above midway of the segments: anthers blue, $\frac{3}{4}$ line long, obtuse at both ends, fixed by the middle: ovary on a stout stipe of more than its own length.

Glendale, Oregon, June 30, 1887, Thomas Howell; the specimens distributed under the name *Brodiæa Hendersoni*.

MUILLA CORONATA. Corm $\frac{1}{2}$—$\frac{3}{4}$ inch thick, an inch below the surface of the ground: scapes very slender throughout, 2–4 inches high: leaves 2 or 3 only, narrowly linear, semi-terete, twice the length of the scapes, the margins retrorsely scabrous: umbels 2—4-bracted, 3—10-flowered: perianth rotate, its segments $1\frac{1}{2}$—2 lines long, exteriorly green with bluish margins, pale blue or nearly white within: filaments greatly dilated, hyaline-petaloid. cuneate-oblong in outline, obtuse, retuse or almost obcordate above: anthers subsagittate, erect, fixed by the middle or a little above it to an abrupt incurved median acumination of the broad filament.

Obtained on the Mohave Desert, late in March, 1888, by the eminent pioneer in West American botany, Dr. C. C. Parry. A highly interesting species, coming in as the third member of Dr. Sereno Watson's well propounded genus *Muilla*, the filaments taking an unexpected phase, their broad margins overlapping, though wholly distinct, thus forming as it were a cylindrical cup or crown, from the orifice of which the yellow anthers are exserted a little less than half their length. In color the flowers are comparable with those of *M. transmontana* (see page 73 preceding).

ALLIUM PENINSULARE, Lemmon in herb. Bulb small. broadly ovate, not deep-seated: leaves few, ligulate, shorter than the scapes, the latter 2 feet high and very stout, conspicuously striate and glaucous: spathe monophyllous, acuminately 2-lobed, at length torn asunder to the base on opposite sides by the expanding pedicels: umbel 25—35-flowered, the pedicels 2 inches long or somewhat less: perianth deep red-purple, the ovate-oblong and slenderly acuminate segments 6 or 7 lines long: filaments scarcely half as long as the perianth-segments, triangularly dilated below: ovary scarcely crested.

Las Cruces Cañon, near San Rafael Valley, 42 miles east of Ensenada, Lower California, 4 May, 1888, J. G. Lemmon. Plant as large and as showy as *A. unifolium*; but the bulb as in the ordinary species of the genus.

Issued June 15, 1888.

ˇ ALLIUM DICHLAMYDEUM. Vegetative characters of the preceding, but the plant only half as large: perianth deep rose-purple, 5 lines long; outer segments oblong, abruptly acute, spreading, the inner lanceolate-oblong, erect and thus apart from the outer, their tips slightly spreading, all entire: filaments subulate, one third shorter than the perianth: ovary crested.

Common on hills along the coast of California; abundant on seaward slopes of the Mission Hills, and at the Marine Hospital, San Francisco, flowering in May and June. The species is apparently confounded in the Botany of California with *A. serratum*, which belongs to the Mt. Diablo range (where the present plant does not occur), and the regions eastward, flowers in March and April, has smaller and rose-colored flowers, with minutely serrate segments. The peculiar attitude of the inner segments in *A. dichlamydeum*, forming, as they do, something like a pitcher-shaped cup in the midst of the others, would not be detected in the dried specimens; hence the confusion.

ˇ ALLIUM CRISPUM. Bulb unknown: leaves several, linear, shorter than the scapes: scape 5—8 inches high, stout, gradually thickened above: spathe 1-valved, cleft to the middle into 2 ovate, abruptly acute lobes, these eventually torn apart to the base by the expanding umbel: pedicels 12—25, stoutish, an inch long: perianth light-purple, 3—4 lines long, the outer segments oblong-ovate, plane, entire, the inner lanceolate, canaliculate, their margins minutely but strongly undulate: stamens broadly subulate, rather more than half as long as the perianth: ovary not crested.

A beautiful species, allied to *A serratum*: obtained by Dr. Parry near El Paso de Robles, in San Luis Obispo County, California, April, 1888.

ˇ THALICTRUM PLATYCARPUM — *Thalictrum Fendleri*, var. *platycarpum*, Trelease, Proc. Bost. Soc. Nat. Hist., xxiii. 304: *T. Fendleri*, Brew. & Wats. Bot. Cal. i. 4, in part. not of

Engelm. Three to five feet high, glabrous except the younger parts and the lower face of the leaves, which bear a sparse pubescence of short minutely gland-tipped pairs: sepals 5, lanceolate, herbaceous and deep green, persistent.

Common in the Oakland Hills, and the inner Coast Range of Californian mountains generally (*T. polycarpum* taking its place in the outer or seaward range of mountains), flowering in April or early May; fruiting in June.

A careful attention to the difference in the pubescence would alone seem to require that plant be separated specifically from the true *T. Fendleri* of the Mexican region. In that species there is no real pubescence; but the lower face of the leaves is covered with two distinct kinds of granulation, a coarser and scattered somewhat papillose sort. and under that a minute and very dense coating of a similar nature. But the Mexican and New Mexican plant has broad membranous caducous sepals, another important character which Professor Trelease, in his admirable and scholarly monograph. appears also to have overlooked. There are, in truth, extremely few phanerogamous species which are common to the two regions so widely different in soil and climate, as New Mexico and the coast of middle California; and it is worth while to call attention to this, that *T. Fendleri* is an autumnal plant (flowering in August and fruiting in September and October), *T. platycarpum* vernal. These combined marks of a different constitution, now indicated, ought to outweigh the fact that, in mere fruit characters, the two species are much alike.

Papaver Californicum, Gray, Proc. Am Acad. xxii. 313.—The color of the flowers, in this highly interesting American poppy, is not quite correctly given in the place cited, the observations having been made upon dried specimens. The petals are not "saffron-colored with a citrine eye," but, of a light brick-red, the spot at the base being green, arched with a narrow circle of rose-red. As regards the number of its petals the species is also somewhat peculiar. In the earliest

flowers which appeared upon the thrifty plant now flourishing in a shady corner of my garden, the two inner of the four petals were reduced to narrow ligulate organs little more than a line wide. In later flowers an opposite extreme is reached; for these flowers are commonly hexapetalous. each of the earlier narrow petals having become replaced, first by a very broad one, and then by two; with another intermediate stage to be noted. in which the flower is pentapetalous, this variable pair of inner petals being represented by a single broad one on one side. and two rather smaller ones on the opposite side. The interest of this remarkable plant, in view of its relation to the Californian *Meconopsis*, is intensified by yet another new discovery which I may name

PAPAVER LEMMONI. Near the preceding, but a larger and coarser plant, 1—3 feet high; corolla twice as large, 2—3 inches broad, apparently of a deeper red. the base of the petals green: capsule broader and merely obovate; stigmas 7—10, their lower half sessile and radiant upon the summit of the capsule, upper half coherent one with another and forming a conical apiculation.

Hilly and mountainous region of San Luis Obispo County, California; collected in 1887, by Mr. J. G. Lemmon: plant exactly intermediate, in its stigmatic structure, between *Papaver* and *Meconopsis*; and no botanist, with these three Californian plants before him, can defend the genus last named; so that our species must take the name

PAPAVER HETEROPHYLLUM — *Meconopsis heterophylla*, Benth. Trans. Hort. Soc. 2 ser.: i. 408: Hook. Ic. Pl. t. 272: Brew. & Wats. Bot. Cal. i. 22.

Even this plant, as it comes to us, through Mr. Lemmon's hands, from San Luis Obispo County, exhibits an almost styleless pistil, the stigmas, although coherent among themselves. resting almost sessile, in a globose knot, on top of the capsule, so that the transition, natural. and geographical, is almost as complete as can be, between our northern *P. hetero-*

phyllum and the extreme southern *P. Californicum*, the *P. Lemmoni* holding precisely middle ground, geographically as well as carpologically.

ESCHSCHOLTZIA MODESTA. Annual, very slender and diffusely branching, a foot high, glabrous and moderately glaucous: leaves small, with few and narrow segments: pedicels axillary, an inch long or more, terete and very slender, nodding in the bud; bud 2 lines long, the permanent portion (torus) with no rim, nearly as long as the broadly ovate calyptra: corolla rotate-spreading, ½ inch broad; petals obovate, not meeting, the rounded apex erose- or sinuate-toothed, or, in later flowers, deeply 3-lobed, pale yellow: stamens 8, in two rows on opposite sides of the pistil, or, in late flowers, 4 only; anthers ½ line long, on slender filaments of a a line's length: pod 2 inches long, narrow, the valves thin: seeds globular, minute, reticulate; cotyledons very narrowly oblanceolate, entire.

Collected by Mr. S. B. Parish, in Los Angeles County, California, June, 1887, and distributed by him under number 1951, with the name "*Eschscholtzia minutiflora*, Wats.?" The description is drawn up from living plants, the seeds having been communicated by Mr. Parish. The species, it will be observed, has many peculiarities. The definitely eight stamens I now observe in the otherwise very different *E. rhombipetala*.

ESCHSCHOLTZIA TENUISECTA. Annual, erect, a foot high, glabrous and little glaucous: ultimate leaf-segments long and slender, gradually tapering from a broad obtuse or truncate apex, widely divergent in the young leaves, less so in the later ones: flower-buds ovate, with a long and gradually attenuate acumination: inner rim of torus nerveless and horizontal (its margin, not its body, in contact with the ovary), the outer coriaceous, about a line deep, red: petals an inch long, widely expanding, bright yellow, with a light-orange

base: stamens about 24; anthers linear, 2 lines long: cotyledons cleft below the middle into 2 filiform segments.

A single herbarium specimen of this, with a pod of ripe seeds, was brought me last year, from Chico, California, by my friend Dr. Parry, who had been impressed with its peculiar aspect as compared with the common species with similarly rimmed torus. The particular elegance of the finely dissected foliage was the only distinctive mark I could detect in the dried specimens; but no sooner had the cotyledons appeared above ground, from the seeds planted, than I saw a new indication of a distinct species. Here let me remark, what I have not until this year been prepared to announce, that the Eschscholtzias whose torus lack the spreading outer rim have entire cotyledons, while those which possess that conspicuous rim have them deeply bifid, *i. e.* cleft below the middle, into two linear segments. In the present species, that considerable breadth of segment which we have in the common sorts is wanting, so that they are to be described as filiform. The foliage of *E. tenuiseeta* is much like that of the insular *E. elegans;* the calyptra is far more slenderly attenuate than in any other known species of the genus.

ESCHSCHOLTZIA LEPTANDRA. Perennial, or at least biennial, a foot or more in height, rather stout, strictly erect and with a somewhat corymbose habit; glabrous and very glaucous: ultimate leaf-segments rather coarse, linear-spatulate, nearly parallel: flower buds oblong-ovate, abruptly and rather sharply acuminate: inner rim of the torus thin-hyaline, erect, pervaded by about 16 stout and prominent nerves, outer greatly reduced, but manifest as a narrow somewhat turgid ring: petals an inch long, widely expanding, lemon-yellow throughout, or orange-tinted below the middle: stamens about 32; anthers filiform and nearly a half-inch long; filaments barely a line long.

Desert plains near Verdi, in the western part of Nevada, in flower May 20, 1888, Mr. C. F. Sonne. In its flowers, and the nature of the torus, this plant recalls *E. Mexicana* of the

desert regions farther south and east; but in habit it is more like the Californian *E. crocea*, though more erect, and more glaucous. The long filiform anthers are a good mark.

POTENTILLA SAXOSA, Lemmon in herb. Perennial, slender, a foot high, pubescent and viscid-glandular: leaves narrow, pinnate, the leaflets in 5—7 pairs, flabelliform, ½ inch long or less, and quite as broad, pedately cleft to the middle into oblong acutish segments: cymes loose, flowers small and inconspicuous; calyx rotate, the segments scarcely 2 lines long; petals yellow, spatulate, acutish, 1 line long; stamens 25—30; filaments slender-subulate; anthers roundish, rather broader than long: pistils 8—10.

Crevices of rocks, in the San Rafael Mountains, Lower California, 6 May, 1888, Mr. and Mrs. Lemmon.

LUPINUS CAPITATUS. Annual, a span to a foot high, parted above the base into numerous short widely spreading or almost divaricate branches; whole plant clothed with soft spreading white hairs: leaflets 5—7, oblong-oblanceolate, acute: racemes few-flowered, short and capitate-congested, at the ends of the greatly elongated naked peduncles: upper calyx-lip deeply notched, lower entire, much longer and nearly equalling the ¼ inch long blue corolla; banner rather narrow, with a small yellow spot in the middle; keel naked: pod quadrate-oblong, 2-seeded.

From Young's Ranch, seven miles north of Flagstaff in the northern part of Arizona; obtained by Mr. and Mrs. Lemmon in 1884; species singularly well marked by its long-peduncled capitate flower-clusters. Only one good specimen was obtained, the others being very young and small, and not well exhibiting the most prominent characteristics of the species.

LUPINUS POLYCARPUS. A foot or two high, rather stout, rigid, with several or many ascending branches: stem and lower face of leaves pubescent: leaflets 7, somewhat fleshy, oblanceolate, an inch long, glabrous above: flowers very

small, in racemes of 4—7 distinct verticils; pedicels a line long: upper calyx-lip bifid, its ovate teeth short, straight and parallel, the lower scarcely longer, 3-nerved, slightly notched at apex: corolla 1½ lines long, deep blue, the middle portion of the obovate retuse slightly reflexed banner white and dark-blue-dotted; wings coherent at the tips, below them distinctly obcompressed, exposing the base of the keel; keel broad and short, ciliate above the middle and below the short blunt retuse apex: pod rigid, slightly falcate, tardily dehiscent, 7-seeded: seeds obliquely oval, 1½ lines long, uniformly dull dark brown, or occasionally paler and with some marblings of very dark brown.

The commonest of all lupines in the vicinity of San Francisco, in low, rich ground, flowering and fruiting in May. On account of its minute and inconspicuous flowers, the characters of which, excellent though they are, are not obvious in the dried specimen, the species has hitherto been confounded with the very different *L. micranthus*; but it is really more related to the coarse fleshy large-flowered *L. affinis*, which it resembles in habit, pubescence, texture and other points.

Trifolium quercetorum. Annual, slender, a span high, glabrous and pale green, the stipules, involucre and calyx scarious and green-veiny: leaflets a half-inch long, cuneate-obovate or -oblong, truncate or retuse, spinulose-serrulate, on slender petioles of an inch long or more: peduncles slender, a little exceeding the leaves; involucre cyathiform, about 5-lobed, the lobes rounded, entire or few-toothed, the green veins not pervading the broad scarious margin, 3—5-flowered: corolla yellowish, 2–3 lines long, inflated in age: calyx teeth lanceolate-acuminate, entire, the lower twice or thrice as long as the upper, far surpassing the involucre and nearly equalling the corolla.

The name *Trifolium fucatum*, as employed in the Botany of California, embraces about three different plants which ought to be separated, and which, indeed, were separated, I

think, by earlier authors; but that assemblage does not include the present plant. Its characteristics of foliage, calyx, and especially of its reduced and blunt-lobed involucre, mark it well as a species. It has been collected apparently only by my zealous pupils, Messrs. Victor K. Chesnut and A. B. Simonds, of the University of California. Its locality is in the Oakland Hills, between Oakland and the Moraga Valley, towards Mt. Diablo, where it was found in April of this year.

SYRMATIUM NUDATUM. Shrubby, slender, diffusely branched, the branches a few inches to a foot long, rigid and a little flexuous, green-barked and glabrous, the nodes an inch apart: leaves 3-foliolate; leaflets oblong, acute, 1—2 lines long, appressed-puberulent; stipular glands large, blackish: peduncles very short or almost obsolete, bractless, 1—2-flowered: corolla 2 lines long: calyx-teeth subulate, straight, erect, somewhat unequal, the longest about half the length of the tube: pod minute, pubescent, the body well exserted, curved into more than a semicircle and tipped with a nearly straight filiform persistent style.

Cedros Island; collected many years ago by Dr. Veatch, and again in 1885 by the present writer.

ASTRAGALUS CIRCUMDATUS. Perennial, low and diffuse, the stems a span long, more or less; pubescence very little, appressed: leaflets in 6—12 pairs, somewhat fleshy, oblong, obtuse, 2—3 lines long: racemes short-peduncled, few-flowered: corolla white, 4—5 lines long, the campanulate calyx half as long, its teeth subulate from a broad base and nearly equalling the tube: pod fleshy, 1-celled, a half-inch long, oblong, obcompressed and surrounded by a narrow turgid margin.

Hanson's Ranch, San Rafael Mountains, Lower California, May, 1888, Mr. Lemmon. The plant bears much resemblance to *A. caryocarpus*, but is smaller in all its parts, and the

Issued June 20, 1888.

obcompressed pods, with their narrow margin, are quite peculiar.

Senecio astephanus. A tall perennial, lightly floccose-pubescent when young, at length nearly glabrous: leaves ample, thin, undivided, the radical nearly a foot long including the short petiole, elliptic-oblong, acute at both ends, coarsely dentate, the teeth spreading, triangular, callous-tipped, the sinuses rounded and the larger of them denticulate: heads few, slender-peduncled, nearly an inch high and two thirds as thick: involucre calyculate at base, its proper scales lanceolate, acuminate: rays none.

Obtained in the mountains of San Luis Obispo County, California, in the summer of 1887, by Mr. and Mrs. Lemmon. A large and apparently rather graceful species, singular in that its very large and loosely corymbose heads are rayless, but otherwise much like those of *S. Greenei;* but the foliage is more like that of *S. Rusbyi*.

Erigeron viscidulus. Perennial, erect, a span high, very leafy throughout, and minutely but densely glandular-puberulent: leaves an inch long, spatulate-linear, acute: heads 1—3, on short bracted terminal peduncles, many-flowered, discoid; scales of the involucre unequal, in 2 or 3 series: akenes sparsely setulose; pappus simple, the bristles nearly equal.—*E inornatus*, var. *viscidulus*, Gray, Syn. Fl. 215.

Fresh specimens from "A high rock near the southeastern corner of Humboldt County, known as Schrœder's Rock," collected by Mr. Marshall in 1887, leave no doubt that the plant is quite distinct from *E. inornatus*. One of the heads, in Mr. Marshall's specimens, displays a single well developed rose-colored ligule.

Troximon Marshallii. Perennial, stout and coarse; leaves more than a foot long, petiolate below, the elongated blade pinnately parted into narrow somewhat falcate-incurved segments an inch long, glabrous and pale green above, woolly-

puberulent beneath, the margins more conspicuously woolly-ciliolate: scapes 2 feet high or more, often with a bract at some distance below the head: involucre an inch high and nearly as broad, of 40 or 50 closely imbricated bracts, the outer half of them foliaceous, ovate, with acute spreading tips, the inner lanceolate to linear-lanceolate, membranaceous, erect: ligules large and showy: akenes 2 lines long, tapering into the filiform stipe of the pappus which is a half-inch in length.

Meadow lands of the southern part of Humboldt County, California, 1887, Mr. C. C. Marshall. The largest known species of its genus; well marked by its very numerous and leafy involucral bracts.

PHACELIA RUGULOSA, Lemmon in herb. Annual, 6 inches high, puberulent and very viscid: leaves mainly radical, 2 inches long, divided pinnately into small 3—5-lobed sessile segments as broad as long: racemes terminal, slender, elongated, on sparingly leafy peduncles: corolla minute, bluish: stamens not exserted: fruiting calyx 2 lines long, the segments narrowly linear below the abruptly dilated summit, exposing the elliptical transversely rugulose capsule: seeds about 30, oblong, $\frac{1}{4}$ line long, encircled by deep and closely connected foveolations, and intermediate sharp ridges.

Lower California, May, 1888, Mr. Lemmon. A species which seems to break down the division between the *Microgenetes* and other sections of *Phacelia*.

PHACELIA LEUCANTHA, Lemmon in herb. Annual, viscid-pubescent, near the last but taller, a foot or two high, the racemes panicled: leaves lanceolate, pinnatifid, the linear-oblong segments entire, or coarsely crenate or dentate: racemes ternate, rather dense: corolla-limb rotate, nearly an inch broad, clear white, the short throat and tube yellow: stamens very short: calyx 3—4 lines long, the linear-spatulate segments far surpassing the oval capsule: seeds 20 or 25,

immature, but apparently deeply favose, the depressions running in lines transversely.

At Del Mar, San Diego County, California, April, 1888, Mr. and Mrs. Lemmon; also what seems a state of the same with corollas less than half as large, from San Luis Obispo County, 1887, by the same diligent botanists.

Russelia retrorsa. Suffrutescent, 4—5 feet high, the branches stoutish and strongly 6-angled, the angles rather retrorsely hirsute-pubescent: leaves subsessile, of firm texture and rough-pubescent, ovate, somewhat rugose-veiny, crenate-toothed, less than an inch long: flowers thyrsoid-clustered at and near the ends of the branches: calyx-teeth ovate, acuminate.

At Rio Blanco, State of Jalisco, Mexico, Dr. Edward Palmer (No. 540), 1886. In the printed list of Dr. Palmer's plants (Proc. Am. Acad. xxii. 442) this very distinct species is confounded with *R. sarmentosa*, which has quadrangular stems that are altogether glabrous, and a different style of inflorescence.

Botanical Literature, Old and New.

It is purposed to give, under the above heading, observations concerning a number of books of botany, in the hope of awakening in the minds of some of our younger workers, all of whom are perhaps a little inclined to be men of one book, an interest in the broader field of general botanical literature. Gray's Manual and the Synoptical Flora, Bentham and Hooker's Genera and De Candolle's Prodromus are all worthy books, great standard treatises which none of us are likely to study too carefully or become too familiar with; nevertheless, they do not comprehend a total of the world's wisdom and learning upon systematic botany. The whole field of botani-

cal study is broader than the conjoined breadth of all the ground these great books cover. Besides, all men are human; all botanists have habits, bad as well as good, and there is always a possibility, and more than a possibility, of one's acquiring bad habits as well as good, by the too exclusive use of a few authors, even the best.

But we trust to show, before having proceeded far in these discourses upon books, that it is not quite creditable in us to have been so ignorant as we have been, concerning the merits of certain works that are rare on American library shelves, and which few if any of us have ever supposed it worth our while to examine.

We do not intend to give anything like the conventional brief review or criticism of even those new books the contents of which we may discuss. Our dissertations here shall be as long, as varied, and as rambling as our mood at the hour of writing may direct.

But, the reader will observe our caption to be "Literature, Old and New," not New and Old, thus giving precedence to the old. It may be that we shall have more to say about old books than new ones. In this, too, we shall follow our own mood, yet hoping to be neither tedious nor uninstructive. There are really many things in the old books which all of us ought to know, the knowledge of which may enlighten and assist us.

I.

*Catalogus Plantarum circa Cantabrigiam nascentium: in quo exhibentur quotquot hactenus inventæ sunt, quæ vel sponte proveniunt, vel in agris seruntur; una cum synonimis selectioribus, locis natalibus et observationibus quibusdam oppido raris. * * * Cantabrigiæ. * * * Anno Domini 1660.*

This is a small pocket compend of the botany of the

neighborhood of Cambridge, England. It is written in Latin, and, with its supplementary index of old English names of the plants, numbers two hundred and eighty-five pages. The author, whose name is modestly withheld, is John Ray, Britain's chief botanical celebrity of the seventeenth century. It is the earliest and the least of all the many volumes of botany which its learned author gave to the world in his day. If I had wished to call attention to the great learning, and the considerable botanical merits of Ray, I could not have chosen a book of his less fitted to illustrate those points; for it was his first effort in the line of botanical authorship; only a small local flora, the genera and species arranged alphabetically, and with no attempt at a methodical sequence or grouping in any part; fungi, mosses, ferns and all flowering plants. in their respective genera, to be sought, each species under the heading of the initial letter of its generic name.

But the tyro, trained up in the belief that Linnæus was a kind of re-embodied Adam, raised up to name again the animals and plants which God had made, may ask how there could be catalogues of plants in John Ray's time, a hundred years before Linnæus? The ready answer, which any well read botanist will give, is, that in those days, a more or less lengthy phrase designated each species, and was at once the name for, and the description of it. That which I believe very few of my readers will be prepared for, is, the announcement that. in this little Cambridge Catalogue, which antedates Linnæus' Species Plantarum by ninety-three years, there occur, as in common use in Ray's time, more than fifty binary plant names which are familiar to us now, are always presumed to be of Linnæan origin, and are always credited to Linnæus. Upon a careful investigation of the application of these Linnæan binary names in this first edition of Ray's Catalogus, I find as many as forty-eight of them to have been applied by Ray and his antecedents to the same species to which Linnæus applied them. The Swedish nomenclator seems, indeed, studiously to have adopted the old binary names, in the place of framing new ones, wherever he could well do so.

I here subjoin a list of the forty-eight names alluded to, as employed in this little book by Ray; and I give the true authorship of each, retaining the alphabetical order of Ray.

1. Allium ursinum, Fuchs, Historia Plantarum, 739 (1542).

2. Alsine media, Camerarius, Hortus Medicus et Philosophicus, 11 (1558).

3. Artemisia vulgaris, Cæsalpinus, de Plantis, l. 11 (1583).

4. Bromus sterilis, Gerarde, Historia Plantarum, 69 (1597).

5. Bryonia alba, Dodoens, Stirpium Historiæ Pemptades, 395 (1583).

6. Caltha palustris, Dodoens, op. cit. 598.

7. Campanula rotundifolia, Gerarde, Historia Plantarum, 367 (1597).

8. Chelidonium majus, Fuchs (1542), but taken from Pliny, with whom the name is the Latin translation of *Chelidonion mega* of Dioscorides.

9. Chrysanthemum segetum, l'Obel, Stirpium Observationes, 298 (1570).

10. Circæa Lutetiana, l'Obel, Stirpium Icones, 266 (1581).

11. Echium vulgare, C. Bauhin, Pinax Theatri Botanici, 254 (1623).

12. Erica vulgaris, Parkinson, Theatrum Botanicum, 1480 (1640).

13. Geranium Robertiamum, Ruellius, de Natura Stirpium, 559 (1536).

14. Hedera Helix, Fuchs, Historia Plantarum, 423 (1542).

15. Hordeum distichum, C. Bauhin, Pinax Theatri Botanici, 22 (1623).

16. Hordeum murinum, Cæsalpinus, de Plantis, iv. 58 (1583).

17. Hyoscyamus niger, Dodoens, Stirpium Historiæ, Pemptades, 447 (1583).

18. Juncus acutus, Ruellius, de Natura Stirpium, 642 (1536).

19. Ligustrum vulgare, Parkinson, Theatrum Botanicum, 1446 (1640).

20. Linaria vulgaris, Bock, Stirpium Historia, 356 (1552).

21. Linum catharticum, Ray, Index Plantarum Agri Cantabrigiensis, 15 (1660).

22. Mentha aquatica, l'Obel, Nova Stirpium Adversaria, 218 (1570).

23. Nymphæa alba, Matthiolus, Commentarii Dioscoridis, 893 (1558).

24. Origanum vulgare, Bock, Stirpium Historia, 35 (1552).

25. Papaver Rhœas, l'Obel, Stirpium Icones, 275 (1581).

26. Pastinaca sativa, Bock, Stirpium Historia, 439 (1552).

27. Polypodium vulgare, C. Bauhin, Pinax Theatri Botanici, 359 (1623).

28. Populus alba, Ruellius, de Natura Stirpium. 119 (1536).

29. Populus nigra, Ruellius, loc. cit.

30. Potamogeton perfoliatus, How, Phytologia Britannica (1650).

31. Ranunculus aquatilis, Dodoens, Stirpium Historiæ Pemptades, 387 (1583).

32. Ranunculus auricomus, Thalius, Sylva Hercynica, 99 (1588).

33. Ranunculus bulbosus, l'Obel, Stirpium Observationes. 380 (1570).

34. Ranunculus Flammula, Dodoens, Stirpium Historiæ Pemptades, 429 (1583).

35. Rhamnus cathartica, C. Bauhin, Pinax Theatri Botanici, 478 (1623).

36. Ribes nigrum, l'Obel, Nova Stirpium Adversaria. 445 (1570).

37. Rosa canina, Bock, Stirpium Historia. 986 (1552).

38. Senecio vulgaris, Bock, op. cit. 284.

39. Sonchus asper, Fuchs, Historia Plantarum, 674 (1542).

40. Scandix Pecten-Veneris, Dodoens, Stirpium Historiæ Pemptades, 689 (1583).

41. Thalictrum minus, Dodoens, op. cit 58.

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42. Tanacetum vulgare, Besler, Hortus Eystettensis. Vern. Ord. 5. t. 5 f. 3 (1613).

43. Trifolium fragiferum, Ray, Catalogus, 166 (1660).

44. Trifolium pratense, Bock, Stirpium Historia, 586 (1552).

45. Urtica urens, Ray, Index Plantarum Agri Cantabrigiensis, 16 (1660).

46. Verbascum nigrum, Bock, Stirpium Historia, 218 (1552).

47. Viola canina, Tabernæmontanus, Eicones Plantarum, 304 (1590).

48. Viola tricolor, Dodoens, Stirpium Historiæ Pemptades, 158 (1583).

Two names in this list, it will be seen, are of Ray's own authorship; that is to say, he has here in his catalogue cut them down from the several-worded phrase to the binary name. The remaining forty-six he has taken up from other authors, whose name, in each case, he is careful to indicate by the proper abbreviation appended to the plant name; but he has not been careful to give the real earliest author of such name, in every instance. I have myself laboriously pursued each of them, to what I believe to be its original source and author; at the same time using the facilities before me for determining that the species thus designated by old authors are the same to which Linnæus re-applied the names. And this identification, let me remark, is seldom difficult or doubtful; for almost every species of plant that has been known for three or four centuries will be found very well figured in one or another, often in many, of the great folios and quartos of pre-Linnæan botany.

In pursuing this little study of Ray's Catalogue, I have found a few Linnæan names which are left out of the above

list for the simple reason that Linnæus applied them to other species than those which they designated according to the earlier usage. There is, for example, a *Lamium album* in Ray, but it is not the *Lamium album* of Linnæus; and there is a *Veratrum nigrum* of the old authors, also in Ray's Catalogue, and this is not a *Veratrum* at all, but the *Helleborus niger* of Linnæus. But the instances in which the author of the immortal Species Plantarum transposed things, giving old binary names a new application, are, I believe, neither very numerous nor difficult to detect.

That the forty-eight names given above constitute a complete list of all of their kind to be found in this little volume of Ray, is not probable. A more thorough gleaning of the pages, doubtless, would have yielded several more; and, if fifty such Linnæan binary names occur, some in the front rank of names, others in the synonymy, in this antique local flora of a small district, we may anticipate a total of several hundred from a thorough canvass of the old standards of pre-Linnæan botany. Such papers as Courtois' Commentary on Dodoens, and Klinsmann's Clavis Dilleniana, exhibit, at a glance, many not here enumerated.

To say that every such name ought to be credited, in all our modern books and catalogues, not to Linnæus but to its real author, is only speaking in accordance with an acknowledged general principle which governs men, or ought to govern them, in all literary work whether scientific or general; that principle of faithfulness to history, which forbids the ascribing to an author that which he took from another and an earlier treatise. To this principle it is time, it seems to me, that systematic botanists should begin to pay more strict allegiance. There are some among us who will. I have therefore been particular to trace each name above given to what seems to me to be its true and original author; and, since many of the books cited are rare and their abbreviated titles unfamiliar, I have written them in full, or at least, as nearly so as seems necessary to a ready understanding of who the author is, and what is the name of the volume.

II.

Preliminary Catalogue of Anthophyta and Pteridophyta reported as growing spontaneously within One Hundred Miles of New York City. Compiled by the following Committee of the Torrey Botanical Club: Justus F. Poggenburg, N. L. Britton, E. E. Sterns, Addison Brown, Thos. C. Porter, Arthur Hollick. The Nomenclature revised and corrected by N. L. Britton, E. E. Sterns and Justus F. Poggenburg. New York, April 25th, 1888, 8vo, pp. xviii. 90.

This new production, ranking, as to plan and execution, so far above the ordinary run of local plant catalogues, merits very special consideration. "Inquire not who said this; but attend to what is said," a noble rule laid down by St. Thomas á Kempis, we are fain to dispense ourselves from keeping in this case.

Truly indeed, in science as in all matters, it is the principle and not the man or men which ought to be regarded; and in scientific affairs least of all should the authority of a man's name or station be taken into the reckoning. But here as elsewhere it is generally the case that that which should be is not the thing which is; and in botany men look to the place whence a book or pamphlet has emanated, and to the author's name.

For those who desire prestige, Columbia College as a center of botanical learning, is not without it, as we all know. After Philadelphia, the parent city of American Science, New York is historically the first; and the botanical luster of Columbia College in the days of Dr. Torrey, was only excelled by that of Harvard in the later years of the universally lamented Asa Gray.

An agreeable feature, and more than that, a truly hopeful

fact regarding the origin of this Torrey Club Catalogue is, that the good work undertaken by it is not attempted by any one man single-handed. The book is the joint product (by no means the first product, however,) of a little but strong republic of active botanists; a republic such as Dr. Torrey alone of all American botanists had the happiness to organize in his life-time, and of leaving after him, to carry on his work, and bear his name, with ever new honors, down to other generations.

This Preliminary Catalogue is an initial effort looking toward a complete descriptive flora of the region defined in the title; a working list, with blank pages for manuscript notes and additions, sent forth for the purpose of eliciting the fullest information concerning the plants of the district, in order that the flora, when done, may be as complete as possible. Occasion has also been taken, as was fittest in such a preliminary list, for applying the philosophical and ethical principles of biological nomenclature; principles which have never heretofore been followed in any treatise, of wide scope, upon North American botany. American authors have hitherto, for the most part, followed the easy and popular way of retaining names of species as given in current books, or as approved within their own circles or cliques, without regard to higher principles. There are few among us prepared to appreciate the amount of library work which has been required for the verification of priority in the case of almost every one of the many hundred names employed in this catalogue; and the committee on nomenclature appear to have executed their task, upon the whole, most creditably. Only a single instance of manifest oversight occurs to me as I glance at the pages; that of *Eryngium yuccæfolium*. Michx., antedated by *E. aquaticum*, Linn.

But a considerable number of failures to attain exact priority, failures in a different way, I would notice more particularly; and first, respecting a few generic names.

It will hardly be questioned that conformity to the original spelling of a name is best, especially when the proposed

amendment of some later author adds a syllable, or otherwise affects the sound of the name. *Sarracena* is what Tournefort, the founder of the genus, and others after him wrote; *Sarracenia* is Linnæus' assumed amendment, but it is no true amendment or correction. *Sarracena* is faultless, and has lately been re-adopted in the greatest of all treatises on genera, Baillon's Histoire. The Greek aspirate, too, not represented in that language by any really alphabetical character, does not seem happily resurrected in the form of an H to make *Heleocharis* when the author of that genus wrote *Eleocharis*. That scarcely seems to rise to the dignity of a grammatical correction. It is not a case of offensively unhellenic writing, like Nuttall's *Epifagus*, almost of necessity corrected into *Epiphegus*. There may be named, however, in this connection, some more important matters which it seems to me our authors might well have taken in hand; the name *Dicentra*, for example. To write "*Dicentra*, Borckh." is to depart rather widely from the ways of historic truth; for Borckhausen published no *Dicentra* nor any name much like it; and we have no right to say that he did. Bernhardi was the author of that truly neat and pretty appellative for this beautiful genus, and he who uses it is bound to give him the credit of it by writing *Dicentra*, Bernh.; but that, alas, is to ignore the founder of the genus. And what can one's duty be but to write the simple truth, which is *Diclytra*, Borckh.? That, as has well been shown by men having access to the original paper of Borckhausen, is no misprint, but just the name which the author meant to make; and the mere issue of an incorrect etymology is what has raised all the fuss, and all the confusion which has been made about it. Meanwhile there are almost countless generic names of bad etymology, and plenty of them with none at all. Of course, *Diclytra* and *Dicentra* are two different names, each with its own author; but the citation of the East American species, under the prior name, involves not a single re-adjustment. All of them were

named as Dielytras long ago, some by Borckhausen himself, others by the elder De Candolle.[1]

It is delightful to see the oriental name *Belamcanda* (Adanson, 1763), instead of the usual *Pardanthus* (Gawler, 1805); and one can not but wish our friends had restored to its place one other Adansonian name, *i. e.*, *Tissa* (1763), instead of *Lepigonum* (Fries, 1817). Here also we may be allowed to suggest that "*Spergularia*, Pers." can hardly be appended in parenthesis as if a more recent equivalent of *Lepigonum;* for Persoon wrote it only as subgeneric or sectional under *Arenaria.* If he had proposed it as generic it would have antedated *Lepigonum*, for Persoon's date is 1805.

Another bit of good service I fancy our industrious Torrey Club people, with their library facilities, might have rendered us, in determining the prior appellation of that genus which they still call *Smilacina.* Mr. Baker of Kew, in his recent elaboration of the Liliaceæ, adopted for it the name *Toraria*, to which course Dr. Gray objected, and showed that that, or at least its full equivalent, *Torara* (Adanson, 1763), was employed to designate generically a very peculiar polygonaceous plant, *Polygonum Virginianum*, Linn., a genus which Dr. Gray thought might be found worthy to be restored. I have not access to the writings of Desfontaines, but I am confident that *Polygonastrum* (Mœnch, 1794), is older than *Smilacina*, and think it may be that name which the genus is entitled to bear.

On page 49 of the Preliminary Catalogue is well shown the need there was of investigating the specific nomenclature of

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[1] Not so with the more recent western species, which need the following re-adjustment:

DICLYTRA CHRYSANTHA = *Dielytra chrysantha*, Hook. & Arn. Bot. Beech. 320: *Dicentra chrysantha*, Boland. Catal. 4; Brew. & Wats. Bot. Cal. i. 24.

DICLYTRA OCHROLEUCA = *Dicentra ochroleuca*, Engelm. Bot. Gaz. vi (1881) 223.

DICLYTRA UNIFLORA = *Dicentra uniflora*, Kellogg, Proc. Cal. Acad. iv. 141: Watson, Bot. Cal. ii. 429.

DICLYTRA PAUCIFLORA = *Dicentra pauciflora*, Watson, l. c.

Carya. Why not also the generic at the same time? The moment surely was opportune, though late, for paying one more of the still unpaid debts which American botanists owe to the genius of Rafinesque. Zoologists long since, beginning, I believe, with the just and magnanimous Agassiz, have given this man his genera in their department of science. In botany, *Hicorius*, Fl. Ludov. 109 (1817), conclusively antedates *Carya*, Nutt. Gen. ii. 220 (1818), and, being the correctly Latinized aboriginal name of these American trees, is altogether unobjectionable.

Among the new adjustments of specific names, of which there are some seventy instances in the catalogue, there are two at least in which the principles of priority appear to us to have been misapprehended. To bring out clearly our meaning, let us ask, which of these two names is most thoroughly in keeping with the doctrine of priority, *Hypericum Sarothra*, Michx. or *Hypericum gentianoides*, Britton, Sterns and Poggenburg? *Rhodendron Rhodora*, Gmelin, or *Rhododendron Canadense*, BSP.? For both these plants, each of which was taken by Linnæus as the type and sole representative of a genus, our authors, while following the opinion of post-Linnæans that they are not valid genera, have combined each of the Linnæan specific names with what is now deemed the right generic name, although earlier botanists, who disallowed the genera took, in each case, the old generic one and used it as specific. Is the specific name, in the genus of one species, to be continued in use, rather than the generic, when generic rank ceases to be accorded? The specific one, be it remembered, was always useless, only formally, not necessarily appended, and was always subsequent to the other in place, usually so in time.

Repeating our question: where does priority really lie? With *Hypericum gentianoides*, BSP., or with *H. Sarothra*, Michx.? The doctrine of priority in nomenclature is the doctrine of a historical settlement of all questions about names. This alone, quite apart from the fact that it promises ultimate fixity, should commend it strongly to the

mind of every educated naturalist. Now, appealing to history. we find this not irrelevant, though not in this case quite decisive fact to be true; that generic names, as a class, have a sort of priority over specific names as a class; that is to say, that botanical writers distinguished genera, in their way, and gave names to them, before they came to the recognition and definition of species. This is not in such wise true that one does not find species recognized, as well as genera, in the very oldest books of botany; but these books exhibit a very great number of genera, and proportionally few recognized species. The old books thus in some fashion represent the natural order by which the human mind generally proceeds in these matters; for who has not observed that unlettered men, or children, recognize genera of plants readily but are more or less blind to species, unless the latter are very strongly marked? But what has a more direct bearing upon our question is, that the early botanists held many monotypical genera, and gave them names; these generic names often remaining the only names the species were known by. Still more important, and, quite decisive of the case in hand, as it appears to me, is the Linnæan recognition and preservation of all old generic names of monotypical genera. Linnæus, in adopting universally that binomial nomenclature which authors for two centuries before him had gradually been coming to, found it needful to reject as artificial a great number of old monotypes, but he was careful as a man could be to save all the old names as species-names. Our nomenclature abounds in them, and we may almost be said to concede something like a superior rank to them among specific names by writing them with an initial capital. At all events, Linnæus, our great teacher in these things, is author of the usage of taking up generic names as specific. But, the two instances under our special consideration are cases in which he retained what are now regarded as invalid monotypical genera, and subsequent authors have been constrained to disallow them. In 1751 he founded his genus *Surothra*. There was but one species, and *Surothra* was all the name it needed.

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Two years later, coming to the fulfillment of his purpose of an universal binomial nomenclature, he gave it its merely decorative or balancing appendage of a specific name and called it *Sarothra gentianoides*. A half century subsequent to this, the author of Michaux's Flora found the generic rank unmerited and transferred the solitary species to *Hypericum*, following Linnæus' own usage, and, as I conceive of it, the true logic of priority, in calling it as a species, by its old-generic and at once oldest name, *Sarothra*. Entirely similar is the history of *Rhododendron Rhodora*, Gmel.; and, in view of all these considerations, I see not how *Hypericum gentianoides* and *Rhododendron Canadense* of the catalogue are defensible.

Equally obscure to me is that logic, if there be any, according to which, a specific name when once published may be displaced in order to the promotion of a prior varietal one. There are, in the catalogue, quite a number of new binary names formed in this way. The practice is unmistakably at variance with one fundamental principle of all order and system, namely, that seniority of lower rank can not take precedence of juniority in a higher. I do not assert that in the affairs of biological nomenclature, this ground-principle of order may not be abandoned. But I do not think it ought to be. And its abandonment would not seem to be justifiable except upon the single possible contingency that there is obligation to keep up a given varietal name when the variety is raised to specific rank. That there is liberty to do this, no one doubts. That it is expedient in many cases, and even desirable, none will question; but, to say that is obligatory, and must always be done, save in such exceptional cases as are allowed in the transference of species, with their names, from genus to genus, is to entail a formidable suite of consequences which I do not think we should any of us be willing, after due consultation, to allow.

If a varietal name must be preserved upon the raising of the variety to specific rank, then a subgeneric name must be preserved upon the promotion of the subgenus to the rank of

a genus; and all this, carried into effect, will simply put a period to our vaunted epoch of binomial nomenclature. To make rules that shall hold alike in respect to generic, subgeneric, specific, subspecific and varietal names (leaving out additional probabilities of subvarieties and named "forms") will be legislating for nothing less than that polynomial system of nomenclature which our forefathers of a hundred and forty years since believed they had abandoned, for themselves and for all ages.

One would not like to say, dogmatically, that customs of the fathers shall not be returned to. One is not so sure that they will not be, in spite of us. History is prone to self-repetition; why not natural-history? Already some of our zoological neighbors, who as a body have always run on a little ahead of us botanists, are back, and up to eyes and ears, in the old polynomial system. Let any one who may think this a queer statement take the trouble of looking up a certain new list of names to be found on pages 591 to 594 of Ridgway's Manual of North American Birds. The binomial bird names in that, published only a year or so since, are not more numerous, on the average, than are binomial plant-names in a certain universal catalogue of plants which was published in the year 1623, *i. e.*, Bauhin's Pinax. In both these lists, with a space of two hundred and fifty years intervening between their dates, the bulk of the names are made up of three or four words. The present ornithological nomenclature is essentially, formally, and almost literally, the old polynomial system returned to; an inevitable result of attempting to bind under the law of priority anything beyond the two terms, generic and specific, which constitute the binomial: and it seems that as many of us as feel our vocation to lie in the direction of sustaining, settling and perpetuating a binomial nomenclature, must let the mere fate of each subgeneric and varietal name, and not our rule-making, take care of it; since to legislate for the preservation of them is to subvert our main purpose.

In respect to what is called the naming of species by impli-

cation, the catalogue follows, in two or three instances, this illogical practice, after the example which was set, as far as America is concerned, at the Harvard herbarium, before even Dr. Gray had duly considered what was the proper course to take. He appears afterwards to have become convinced by a study of De Candolle's "Nouvelle Remarques sur la Nomenclature Botanique," that to write, for example, "*Neillia opulifolia*, Benth. & Hook.," a thing which he had formerly allowed, was entirely wrong; and the argument, which he both quotes from De Candolle and strengthens by observations of his own, is so fully and convincingly given on pages 436 and 437 of the December number of the American Journal of Science for 1883, that there is no need of here repeating it. According to that argument it is erroneous to write *Neillia opulifolia*, Benth. & Hook., because those authors have nowhere published such a name. They have but indicated an opinion that the *Spiræa opulifolia* of Linnæus and its near allies are better placed in the genus *Neillia*. In as far as I know, the actual naming of the species in question under *Neillia*, was first done in the Botany of California; and so it should be written. *Neillia opulifolia* (L.), Brew. & Wats.

It was inevitable that, in the restoration of old specific names, the committee on nomenclature should find themselves compelled to introduce an unpleasant combination here and there. *Echinocystis echinata*, which they make apology for in the preface, meets, however, with some relief when placed along with the western *E. muricata;* and both those names are, again, more than justified by the fact that we have, in some parts of the world, species whose fruits are neither echinate nor muricate, but nearly or quite smooth. Yet, even where, as in the proposed new flora, *E. echinata* will stand unrelieved, its tautological character will be no more obtrusive—even less so—than at least two which we recall as having been made by authors of the highest reputation, and which are everywhere received. These are *Agrimonia Agrimonioides*, Linn. and *Bigelovia Bigelovii*, A. Gray. As for false names, such as the authors have in some cases restored,

this kind are always numerous, always liable to be made, through ignorance, at time of publication, of the characteristics of plants, and there can be no such thing as eliminating them but by revolutionizing nomenclature. In this category, however, what name can ever be made more contrary to the real character of the plant than *Galax aphylla*, Linn. ? But it is everywhere accepted.

One course of procedure has been taken in this otherwise most praiseworthy catalogue which is certainly anomalous in a work taking its stand so firmly on the historical basis. I refer to the citation of Linnæus as author, for all the genera of Tournefort, Dillenius and others of their time. There was not bibliological necessity for this: because all these genera are faithfully accredited, each to its true author, in Gray's Manual even, not to say De Candolle's Prodromus and Baillon's Histoire.

It is time to conclude these remarks. They would have been fewer and briefer but for the uncommon interest which this new Catalogue elicits. It is a production which can not fail to create among us a deeper concern than has yet been awakened regarding the element of literary justice in botanical authorship; an element which not only commends itself to our moral sense, but also promises to give us permanent names. We have felt like greeting it with only our profoundest admiration and our warmest praise; and this we have done after the most genuine method, by trying to indicate wherein we think future editions, under whatever title or in whatever form, may be brought into still more perfect conformity to the maxims we are so inexpressibly glad to have seen adopted in this prodromus.

We wish our colleagues all speed in the work of completing what they have so well begun. Their new Flora of New York will be much wished for until done. It is foreordained to possess merits which will procure for it a circulation considerably beyond the territory whose vegetation it is especially to deal with; but after all that, the present Preliminary

Catalogue will be prized in future years as a work which marked, in America, the opening of a new era in the literature of our science.

The Botany of Cedros Island.

Cedros Island, written Cerros[1] on the older maps, belongs to the Mexican Republic; and, although from an economic point of view nearly worthless, being uninhabited and uninhabitable, it is nevertheless the largest of the Mexican coast islands. Its location is about midway of the Mexican Territory of Lower California, and some forty miles distant from the shore. It forms, together with the small island of Natividad which intervenes between its southern extremity and the mainland, the western boundary of the large and beautiful and quiet Bay of Sebastian Viscaino, so named in worthy commemoration of the early Spanish navigator.

The island is of an obscurely triangular outline, widening gradually from the narrow and sharp northern extremity to a breadth of about nine miles at the southern end, the whole length being more than twenty-one miles. It is of volcanic origin, rising sharply from the sea, with numerous peaks of which the highest has an altitude of a little less than 4,000 feet.

Lying as far down as the twenty-eighth degree of latitude, and therefore far away from the Pacific coast centers of commercial activity and scientific research, it nevertheless came to pass that the natural history of Cedros began to be known

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[1] The cedars which grow on it—*Cedros* in Spanish—gave the island its name: but the softness of the d in that language, often scarcely audible to foreign ears, evidently led to its omission in the English speaking of the name, and so writers in English came naturally to the erroneous "Cerros."

far in advance of the time when our Californian coast islands first received attention. As early as the year 1859 a small expedition went forth from San Francisco to explore Cedros in hope of verifying certain rumors which assigned to its mountains great mineral wealth. Whalers, seal hunters and fishermen had found the waters of Sebastian Viscaino Bay, and particularly of some of its large landward inlets, like Scammon's Lagoon, abounding in valuable sea animals, and were making most remunerative voyages thither yearly. These men gathered from the Indians of the Lower Californian peninsula the tradition of gold and silver on this great desolate unpeopled island. But the prospecting parties sent out, returned empty-handed; reporting nothing there in the line of mineral productions except small quantities of iron and copper ore.

Dr. Veatch, who was one of this party, in kindness to his friend the late Dr. Kellogg, and in view of adding material to the herbarium of the then newly organized California Academy, brought with him fair specimens of some twenty-five different shrubs and herbaceous plants. These proved to be, almost without exception, species new to science Some of the most remarkable of them were published soon after, by Dr. Kellogg, in the Hesperian, the descriptions being accompanied with colored figures. Others were described in the early volumes of the Proceedings of the Academy, and a few of them have, in more recent years, been published by the present writer.

Dr. Veatch was not a botanist. He reported Cedros as being extremely sterile and nearly destitute of vegetation. His collection was scant; but so entirely novel was the character of it, that botanists have, ever since his day, wished for a more special and thorough investigation of it. The island is 700 miles, or more, distant from San Francisco; it lies out of the course of ocean travel; its shores are visited by none but whalers and fishermen, who go from San Diego in small open boats, entirely unfitted to accommodate even the most hardy and venturesome of the fraternity of natural-

ists. The shores when reached are barren in the extreme, tenantless, desolate; the long extended mountain ranges affording but one single stream of water not too salt for use. The thorough scientific exploration of such a place is still waiting to be made, and doubtless will long wait.

But, in the spring of the year 1885, more than a quarter of a century after Dr. Veatch's sojourn there, the writer was privileged to devote three days to botanizing on one small corner of the island. Having joined the veteran naturalist, Mr. George W. Dunn, upon a voyage from San Diego to the island of Guadalupe, we determined, at the expiration of our time on that island, to take the two days' sail southeastward and make a landing upon Cedros.

Although we ought not to have traversed much more than ninety miles of sea in getting to our destination, we had been out from Guadalupe fifty hours when, in the early morning of the 27th of April, we first beheld the peaks of Cedros rising blue on our eastern horizon, some forty miles distant still; when we had covered half that space the breezes forsook us altogether, and we had a tedious half day studying from afar the island's ribbed and furrowed and barren western slopes; our attention being diverted now and then to the skimming flight of a flying fish, or the sporting about us of gray whales as large as our boat itself, which object they seemed to regard with as little fear or suspicion, as if it had been only some other sea-beast of their own alliance. But an afternoon wind all at once gave us good speed, and we were soon near enough the shore to both observe its trees and larger shrubs, and to be a little hindered in our progress by vast irregular fields of kelp, the thicker parts of which our seamen's skill was constantly engaged in avoiding. Only an hour before sunset had we rounded the northern extremity of the island and cast anchor off a narrow strip of pebbly beach. We were immediately set ashore, in order that while daylight still remained, we might get a glimpse of what the morrow's botanizing in this strange spot was to be like. Climbing up from the narrow beach over a few feet of irregu-

larly precipitous rocks, we stood at the mouth of a small ravine leading up into the hills. The soil here was of a hard yellow clay, dry as dry could be, and in it were growing the uncommonly pretty red-flowered *Pentstemon Cedrosensis* and *Mentzelia cordata*, both familiar to us in the figured representations in the Hesperian, and in the old and not well kept herbarium specimens which Dr. Veatch had brought to California so many years before. Two evergreen shrubs which grew on these lower hills in sufficient quantity to impart an appearance of verdure which we had noticed as we had sailed near the shore, were the *Gilia Veatchii* and *Harfordia frutescens*, the latter then new to me; for I had overlooked the poor fragment of this at that time still unpublished thing, which Dr. Veatch had preserved.

At an early hour of the day following, our ascent to the summit of this part of the island was begun, the upward course being taken from the mouth of one of the broadest of the ravines. These ravines—and we crossed the lowest parts of a number of them before choosing by which one we would make the ascent—were all somewhat moist, in spots; but every springy place was nearly destitute of vegetation, the water being strongly salt or alkaline; even the stagnant pools in hollows of the rocks were pools of brine, and the damp rocks were glittering with salt-crystals. Only upon passing to points lying above these salt oozings was any considerable vegetation seen. But long enough before the pine-crested summit of the ridge was gained we had collected good flowering specimens of such rare and desirable shrubs as *Diplacus stellatus*, *Sphæralcea fulva*, *Hamya arborea*, and the juniper, *Juniperus Cedrosanus*, which gave to the island its name. Very near the summit, which is adorned with open groves of *Pinus muricata*, in which some of the trees may be seventy feet high, we found the *Arctostaphylos bicolor*, *Eriogonum molle* and the shrubby *Senecio Cedrosensis*; the last two being new discoveries.

Back from this first excursion at a little past midday, our party sailed along the shore a few miles southward, landing

for the second time at the opening of a broad arroyo the course of which, for some distance back from the shore, lay between low table-lands; and here vegetation was more abundant than we had elsewhere seen except at the island's pine-clad summit. The peculiar *Agave* of the island was here abundant, and, fortunately for our wish to determine whether it was a new or an old species, many of the specimens were just in full flower.

Our three days' stay was occupied in sailing southward from beach to beach, a few miles at a time, going ashore and making such brief explorations as we could in such of the various cañons and arroyos as looked most inviting. I remarked, at every new landing, and in each ravine, as we passed along, a few species not seen before. Each separate cañon appeared to have some of its own; but there were other species which might be seen on every hillside. The most conspicuous objects everywhere were the clumps of what Dr. Veatch and his party so naturally denominated the elephant tree. These trees, at our time, had not put forth their leaves, and their low thick unwieldy trunks, of which there were always several from the same root, clothed with their perfectly smooth gray skinny bark which always looks like distended skin on a very fat animal, could hardly fail to suggest the limbs of the elephant. There are no parts of the islands, except the higher elevations, upon which this tree does not thrive; but the largest specimens seen were in the arroyos not far back from the shore. Agreeably to its aspect of a swollen limb, the epidermis of the trunk is really, as it were, distended by a very thick soft inner bark, more than an inch in depth, which, when cut, exudes a great quantity of some gummy or pitchy substance, quite resembling that yielded in less quantities by some of the most poisonous species of rhus, or sumac; but this product of the elephant tree is quite innocuous, as I can attest, who, although readily subject to all that poison oak can inflict on human flesh, remained unhurt by contact with the exudation from this tree. Although in the list of island plants I retain for this the name

given it by Dr. Gray, as the type of a new genus, *Veatchia*, I am not over confident that it is not, what Dr. Kellogg at first called it, a genuine *Rhus*. But we shall hope for better material of it within a few years; for, although it was supposed to be endemic upon Cedros, I am well assured by an intelligent sailor, that the same tree is common enough on the islands that lie within the Gulf of California; moreover, Mr. W. G. W. Harford has informed me that he saw it on the southern part of the peninsula of Lower California. I was even half expecting that Dr. Palmer would have found it during his recent botanical explorations on the Sonora side of the gulf; but in this I have been disappointed.

My three days of botanizing on this island yielded only some eighty species of plants; but that is a considerable number to be found at about the most unfavorable time of the year, on an island which has uniformly been reported to be as nearly devoid of vegetation as can be imagined. My explorations were restricted within very narrow limits, embracing only a very insignificant fraction of the island's whole area. I suppose that if a zealous botanical collector could get there, carrying with him all the means of subsistence, and retaining the ability to travel over its sharp and lofty hills and through its many scores of cañons, during all the late summer and early autumnal months, that is, during the showery time of the year, he would perhaps raise the list of species of flowering plants and shrubs up to the number of three or four hundred.

Of the twenty-five species obtained by Dr. Veatch during his stay there in 1859, only three or four were not rediscovered by myself; and these which rest on his authority alone, I indicate in my list, by an asterisk. I omit from the catalogue the name of "*Veatchia crystallina*, Kell." which is *Triteleia hyacinthina* (Lindl.), Greene, because I think the ascription of that plant to this place was an error. Dr. Kellogg knew it only from plants cultivated in San Francisco; and cultivators are too apt to lose or to confuse their records of the origin of bulbs and corms.

A glance at the list will show that a very great proportion of the species are still unknown from any other part of the world. But it will not do to call all these endemic plants. They may or they may not be such; for those parts of the Lower Californian peninsula which lie opposite the island and not more than forty or fifty miles away, are almost completely a *terra incognita*, to this day. It is not improbable that, whenever both the island and the nearest mainland shall have been fully investigated as to their flora, it will be shown that this, like the other islands of the Pacific Coast, has its own considerable proportion of species truly endemic; until such a time shall come, it will be idle to speculate upon the possible geographical limits of these still strange and surpassingly interesting Cedros plants.

A List of the Known Species of Cedros Island Plants.

1. Clematis pauciflora, Nutt.; Torrey & Gray, Fl. i. 657. Two or three specimens in a shady and fertile part of the principal cañon visited.

2. Sisymbrium pinnatum (Walt.). Greene, Bull. Cal. Acad. ii. 390. One small plant, in ripe fruit, in the mouth of a dry open cañon.

3. Cleome Isomeris = *Isomeris arborea*, Nutt.; Torr. & Gray, Fl. i. 124. Frequent, but stunted.

4. Oligomeris subulata (Delile), Boiss. Common near the sea.

5. Frankenia Palmeri, Watson, Proc. Am. Acad. xi. 124. In considerable quantity in one locality near the northeastern extremity of the island.

6. Sphæralcea fulva. Erect and stout, 2—4 feet high, sparingly branching, suffrutescent, clothed densely throughout with a yellowish stellate pubescence: leaves small, of thick and firm texture, of triangular-lanceolate outline, coarsely toothed: calyx 4 lines long, cleft a little below the middle into triangular acute segments: corolla $\frac{3}{4}$ inch long, light scarlet: fruit unknown.

In clay soil, back from the sea; infrequent.

7. Rhamnus insularis, Kellogg, Proc. Cal. Acad. ii. 20. Of somewhat stunted growth, as compared with the same on the island of Santa Cruz, but still sufficiently unlike *R. crocea*.

8. Veatchia Cedrosensis, Gray, Bull. Cal. Acad. i. 4. Equably distributed on rounded hill-tops, or on steep declivities, or, growing most vigorously in broad open level places near the sea (page 198).

9. Rhus Lentii, Kellogg, Proc. Cal. Acad. ii. 16. Common in low places where the cañons open out to the sea. A more sightly shrub or small tree than the next, by virtue of its rather handsome glaucous foliage and large red drupes, the size of which is nevertheless considerably exaggerated in the figure in the Hesperian.

10. Rhus integrifolia (Nutt.) Brew. & Wats. Bot. Cal. i. 110. Less frequent than in California.

11. Rhus laurina, Nutt. in Torr. & Gray, Fl. i. 219. Only a few small bushes were noticed.

12. Astragalus fastidiosus (Kellogg), Greene, Bull. Cal. Acad. i. 186. Not plentiful as species of the genus are apt to be in their localities.

*13. Astragalus insularis, Kellogg, Bull. Cal. Acad. i. 6. Still known only in the specimens obtained by Veatch.

14. Syrmatium nudatum, Greene (see page 173).

15. Hosackia flexuosa, Greene, Bull. Cal. Acad. i. 82.

16. Dalea megacarpa, Watson, Proc. Am. Acad. xx. 359. A single depressed shrub in a cañon near the sea; differing from Mr. Pringle's Sonora type in that the branches are shorter and stouter, and the stipular base of the leaf-stalk develops a pair of persistent somewhat recurved spines two lines long or more; but there are mere traces of a similar development in the Sonora original.

17. Photinia arbutifolia (Ait. f.) Lindl. Bot. Reg. t. 491. A few well grown shrubs in a deep shady cañon; probably the southern limit of a species particularly abundant on coast islands far northward.

18. Hauya arborea, Kellogg, Bull. Cal. Acad. i. 137: *Œnothera*, Kell. Proc. Cal. Acad. ii. 32: Hesperian, March, 1860, with figure. The plate in the Hesperian magnifies the beauty of this shrub. The flowers are far less numerous than represented, and the twigs which bear them are slender and almost leafless. The habit of the shrub is lithe and slender, the branches few, the height three to five feet. It was just beginning to flower at the end of April.

19. Œnothera Cedrosensis, Greene, Bull. Cal. Acad. i. 187. One specimen obtained, in a half shrubby condition, as if a survival of the winter; for I doubt not the species is annual, appearing in the rainy season of summer and autumn. It now occurs in Dr. Palmer's 1887 collection from Sonora.

20. Mentzelia cordata, Kellogg, Proc. Cal. Acad. ii. 33. Very common in clayey or stony ground along the shores. The petals in this plant do not spread, but retain an erect position, forming an almost tubular corolla after the manner of the inner ranks of petals in certain cactaceous flowers. The figure in the Hesperian does not well

show this, although the delineator seems to have had some notion of it.

21. PETALONYX LINEARIS, Greene, Bull. Cal. Acad. i. 188. With the last species, but less frequent.

22. ECHINOCYSTIS MACROCARPA, Greene, loc. cit. Rather scarce, and only dead vines with dry and empty pericarps seen.

23. ECHINOCYSTIS ———. A small annual species in the same condition as the preceding.

24. MAMILLARIA GOODRIDGII, Scheer, in Salm, Cact. 1849. 91.

25. ECHINOCACTUS EMORYI, Engelm., Emory's Rep. 156.

26. CEREUS ENGELMANNI, Parry, Am. Jour. Science, 2 ser. xiv. 338.

27. CEREUS EMORYI, Engelm., Am. Jour. loc. cit.

28. OPUNTIA ENGELMANNI, Salm, Cact. 1849. 235. All these cactaceous plants more or less common, but none of them of luxuriant growth except the mamillaria.

29. GARRYA VEATCHII, Kellogg, Proc. Cal. Acad. i. 40.

30. GALIUM ANGUSTIFOLIUM, Nutt. in Torr. & Gray, Fl. ii. 22.

*31. BRICKELLIA CEDROSENSIS, Greene, Bull. Torr. Club. x. 86.

32. GUTIERREZIA SAROTHRÆ (Pursh) Britton in litt.=*Solidago Sarothræ*, Pursh, Fl. ii. 540: *Brachyris Euthamiæ*, Nutt. Gen. ii. 163: *Gutierrezia Euthamiæ*, Torr. & Gray, Fl. ii. 193. A reduced state of the species, and not frequent.

33. Baccharis sarothroides, Gray, Proc. Am. Acad. xvii. 212.

34. Bigelovia tridentata. Greene, Bull. Torr. Club. x. 126. Common in moist ground near the seashore.

35. Bigelovia veneta (HBK.), Gray, Proc. Am. Acad. viii. 638. With the last.

36. Franseria chenopodiifolia, Benth. Bot. Sulph. 26.

37. Franseria camphorata, Greene, var. leptophylla, Gray, Proc. Am. Acad. xxii. 309. Dry hills; rather common.

38. Iva Hayesiana, Gray, Proc. Am. Acad. xi. 78. Along the shores, sparingly.

39. Bebbia juncea (Benth.), Greene, Bull. Cal. Acad. i. 180. In arroyos near the sea, commonly six or eight feet high, its branches few and reedy, the slender main stems woody but weak, supporting themselves amid the branches of *Rhus Lentii*, or more frequently among those of the similar looking *Galvesia juncea*, together with the last often forming impenetrable rush-like masses as broad as high.

40. Verbesina hastata, Kellogg, Bull. Cal. Acad. i. 140. On dry hills; not common.

41. Encelia stenophylla, Greene, Bull. Torr. Club. x. 41. Very abundant in one of the broad arroyos, but not elsewhere seen; not in flower.

42. Viguiera lanata (Kellogg), Gray, Proc. Am. Acad. xvii. 218. Common on the dry sides and tops of the hills, suffrutescent and evergreen, not in flower, but, with the white foliage, one of the most conspicuous plants of the island at all seasons.

* 43. HEMIZONIA FASCICULATA (DC.), Torr. & Gray, Fl. ii. 397.

44. PERITYLE FITCHII, Torr. Pac. R. Rep. iv. 100.

45. POROPHYLLUM GRACILE, Benth. Bot. Sulph. 29. On dry rocky slopes, in a reduced condition.

46. ERIOPHYLLUM CONFERTIFLORUM (DC.), Gray, Proc. Am. Acad. xix. 25. Common along with the last, in a greatly reduced form only a few inches high, but rigidly shrubby and almost spinose in its sterile parts; well in flower at our date.

47. SENECIO CEDROSENSIS, Greene, Bull. Cal. Acad. i. 194. A shrubby species, not in flower; only a foot or two high. with foliage resembling that of *Pedicularis Canadensis*: plentiful at the very summit of the island, among rocks.

48. TRIXIS ANGUSTIFOLIA, DC. Prodr. vii. 69. Rather common in arroyos and on hillsides; in flower.

49. ARTEMISIA CALIFORNICA, Lessing, Linnæa, vi. 523. Frequent, but dwarfed.

50. MALACOTHRIX CLEVELANDI, Gray, Bot. Cal. i. 433. Only a few small plants seen, and past flowering.

51. ARCTOSTAPHYLOS BICOLOR (Nutt.), Gray, Proc. Am. Acad. vii. 366. Common toward the region of pines near the summit.

52. GILIA VEATCHII, Parry, Bull. Cal. Acad. i. 198. A compact shrub a foot or two in height and breadth, with small evergreen pungent leaves, the whole at first view somewhat resembling a juniper, but the foliage viscid and very fragrant flowers ochroleucous, tinged outside with a bronze-like shade of purple; common on all hillsides: in flower.

53. Phacelia ixodes, Kellogg, Bull. Cal. Acad. i. 6.

54. Cryptanthe Cedrosensis, Greene, Pittonia, i. 117.

55. Pentstemon Cedrosensis, Kellogg. Proc. Cal. Acad. ii. 19. A low very handsome species, frequent in the arroyos, nearly past flowering.

56. Mimulus cardinalis, Dougl.; Hort. Trans. ii. 70. In the moist cañon, along with *Photinia*, flowering luxuriantly; probably the most southerly station for the species.

57. Diplacus stellatus, Kellogg. Proc. Cal. Acad. ii. 19. Species exceedingly well marked by its stellate pubescence and rather small corolla: common, but most so toward the summit, where it was well in flower.

58. Galvesia juncea (Benth.), Gray, Proc. Am. Acad. xxii. 311. One of the characteristic shrubs of every arroyo; scarcely in flower at our date.

59. Monardella thymifolia, Greene, Bull. Cal. Acad. i. 211. Summit of the island; a neat compact shrub, scarcely in flower at the season.

60. Teucrium glandulosum, Kellogg, Proc. Cal. Acad. ii. 23. Only a few specimens seen.

61. Salvia Cedrosensis, Greene, Bull. Cal. Acad. i. 212. A small shrub, common at middle and higher elevations.

62. Verbena lilacina, Greene, loc. cit. 210. A tall and partly shrubby species, common in arroyos, passing out of flower; the lilac-colored blossoms very fragrant.

63. Harfordia fruticosa, Greene, in Parry, Proc. Davenp. Acad. v. 28. The commonest bush at all lower and middle elevations; rigidly erect, the branches short-jointed, and clothed with small persistent leaves. The flowering season

must be summer, as only a few fruits of the preceding season were left to indicate the affinities of the plant. It was first published as a *Pterostegia* (Greene, Bull. Cal. Acad. i. 212).

64. ATRIPLEX CALIFORNICA, Moquin. in DC. Prodr. xiii². 98. Frequent near the seashore. The root of this familiar western seashore plant has never been described. It is fusiform, an inch more or less in thickness, several inches long, of a deep amber color both without and within, juicy, and sweet, with the flavor of beets.

65. MIRABILIS CALIFORNICA, Gray, Bot. Mex. Bound. 173.

66. QUERCUS ———. A merely shrubby species of the White Oak series; leaves small, spinose-toothed and persistent; frequent midway up the cañons.

67. JUNIPERUS CERROSANUS, Kellogg, Proc. Cal. Acad. ii. 37. (See page 197).

68. PINUS MURICATA, Don. (See page 197).

69. ERIOGONUM FASCICULATUM, Benth. Trans. Linn. Soc. xvii. 411.

70. ERIOGONUM MOLLE. Shrubby, the leafy branches a foot or two high; leaves oblong, obtuse at both ends, 2—4 inches long on petioles nearly as long, cinerous above and beneath with a dense short velvety pubescence and altogether devoid of white wool: involucres few, many-flowered, corymbose at the summit of stout naked peduncles a foot or two long.

Rocky summits of the extreme north end of the island; a species of singular aspect; not in flower.

71. ERIOGONUM ———. An undescribed species with white-woolly foliage, apparently suffrutescent, common on dry flats back of the seashore, but not in flower.

72. Euphorbia albomarginata, Torr. & Gray, Pac. R. Rep. ii. 174.

73. Euphorbia misera, Benth. Bot. Sulph. 51. Scarce. and of stunted growth.

*74. Simmondsia Californica, Nutt. Lond. Journ. Bot. iii. 400.

*75. Viscainoa geniculata (Kell.), Greene (see page 163). Some of Dr. Veatch's specimens were from the peninsula, others from the island; and now, since my page referred to was printed. Dr. Palmer has distributed specimens from an island in the Gulf of California, and also from the mainland shore of that body of water, *i. e.*, the Sonora coast.

76. Agave Sebastiana. Greene, Bull. Cal. Acad. i. 214. (See page 198).

77. Juncus robustus, Watson, Proc. Am. Acad. xiv. 302. A rank growth of this species surrounds the spring near the seashore whence seamen are wont to replenish their casks, and which is called the "watering place."

78. Scirpus riparius (R. Br.). Spring, in Benth. Fl. Austr. vii. 327. Frequent in moist places however saline.

79. Carex angustata, Boot.? In the deepest cañon, in moist ground, along with *Mimulus cardinalis*.

80. Adiantum capillus-veneris, Linn. Sp. 1096. With the species last named.

81. Pellæa andromedæfolia, Fée. Gen. Fil. 129. Under pines, at the summit of the island.

82. Notholæna candida. Hook. Sp. Fil. ii. 116. Dry rocky hillsides; much reduced. the powdery coating of the fronds clear white.

On Some Species of Dodecatheon.

The western members of this strictly American genus had long met with but indifferent treatment at the hands of American botanists. Published, as all except one of them had been, in Europe, by men who had diagnosed them in the living state, either on their native soil, or in European gardens, or in both places—published, therefore, by those who were in possession of a good knowledge of the plants, and whose judgment ought to have been deferred to,—it fell to the lot of them all to get placed, in the Synoptical Flora, as mere varieties of *D. Media*, the only member of the genus which botanists of eastern America had means of knowing well.

The first step in the way of reparation was well taken, by the late Dr. Gray, in a paper printed in the September number of the Botanical Gazette for the year 1886. I quote his opening paragraph:

"Probably every botanist who has turned his attention to this genus, has suspected it to be of more than one species. But those who [*upon a mere herbarium acquaintance with the plants, it will be understood*] have attempted to deal with the numerous now extant forms have been baffled in their endeavors to distinguish and define them. In the Synoptical Flora of North America I could do no better than to arrange the forms loosely under seven varieties. If I have now done better in the attempted discrimination of five species the credit is largely due to indications and specimens supplied to me by two western correspondents, Mr. Suksdorf, of Washington Territory, and Prof. L. F. Henderson, of Oregon, to the latter especially in pointing out to me the anomalous character of the form which I have accordingly designated by his name."

The "anomalous character" on which *D. Hendersoni* is based is the operculate capsule; but that is far from being any peculiarity of that species.

D. ellipticum, to which was attributed a capsule opening normally, and even some of the plants confounded with *D. Jeffreyi* in the Revision, have the same dehiscence which is supposed to be found only in *D. Hendersoni;* and all the forms of the genus which inhabit either the plains or lower mountains of California, have just that dehiscence. Only the true *D. Jeffreyi*, a plant of the high Sierra, has the valvular dehiscence of the typical species.

But there are characters, of equal weight with any discovered by Dr. Gray's Oregon correspondent, which appear to have remained unnoticed hitherto: although clear indications of them will appear in even the herbarium specimens, when once they shall have been pointed out. I refer first to certain characteristics of the roots. The roots of all the species consist of a bundle of fleshy fibres, which are attached to a distinct crown from which arise, in their season, the leaves and scapes. The roots themselves are renewed annually: only the crown remaining perennial.

Now the species fall into two marked groups according to the season of the year at which the new roots are formed: for in some they are produced at the beginning of the dry season, remaining dormant but alive until autumn; in others they do not form until the beginning of the wet season. Moreover, in the species whose new roots are made at the end of spring, the old roots simply die while the new ones are being formed; but in those whose roots are not renewed until autumn, the old roots, in spring-time, do not die, but are, in part at least, transformed into tubers destined to become new plants.

In *D. Hendersoni*, for example, the roots, having performed their first function in the nourishing of the plant until the flowering, become detached from the crown, diminish in length, increase in thickness, and ultimately become tubers each with a bud at the upper end. After the five months of summer drought, the parent crown sends out its new set of

fibro-fleshy roots; but the tubers become new plants, each with a single leaf only, for this first season of its existence.

In another species, and that the commonest one in my vicinity, all or nearly all the roots, at the end of the flowering period decay entirely, while about the crown above where they were attached there are formed independently a number of small granular bodies which, like the tubers from the metamorphosed roots of *D Hendersoni*, are destined to develop as young plants at the return of the growing season. These and other characteristics of several species which do not appear to have been described may best be given diagnostically; and, since the existing confusion of the synonymy would only become worse confounded by describing even probable new species under old names which are already of varied and dubious application, I propose a new one for the first which I describe, although I consider that it may possibly be identical with the *D. ellipticum* of the Plantæ Prattenianæ. There is no description extant which applies to the plant, however, although there are specimens, I think, in several herbaria; and this I call, provisionally,

DODECATHEON PATULUM. Low and stoutish, pale green and very glandular throughout: roots detaching and changing to tubers at flowering time: leaves a little fleshy, rosulate-depressed, an inch or two long, elliptical, entire, attenuate to a short petiole: flower very large for the plant, usually 5- but frequently 6- never 4- merous; segments of the corolla mainly of a pale cream-color, the base of a dark velvety purple with an outer circle of yellow: androecium very short, less than 2 lines long; filaments connate into a tube, but exteriorly appearing distinct and triangular and ornamented with crowded and undulate transverse folds, the broad basal part, and the acute apex of the triangle dark velvety purple, median part yellow; anthers deep blue-purple, scarcely a line long, linear-oblong, with a broad retuse apex, spreading away from the elongated and much exserted style: capsule oblong,

circumscissile : seeds depressed-globose, whitish, the testa sinuously reticulate.

Low moist places along the lower Sacramento, also in alkaline soil along streams at the eastern side of the Livermore Valley in the Mt. Diablo Range, and in the Oakland Hills back of the cemetery. From the size of the plant it may have been included by Dr. Gray in his *D. ellipticum*, the prominent characteristic of which is made to be a "globular capsule, hardly surpassing the calyx, opening from the apex by valves." In the present plant the capsules may be found globular and hardly surpassing the calyx ; but that is a young and immature condition. It is, indeed, a curious fact in relation to all the species which I am familiar with, that the ovary, after the falling away of the corolla, obtains. first of all its full breadth, at which period it may be oval or even almost globose and little surpassing the calyx, after that increasing in length and becoming oblong or cylindrical. So peculiar, and so very slow is the fruit development that. after the lid has formed and fallen away, leaving an open capsule, the seeds remain firmly attached to the still living placenta, and seem not yet ripe. I am thus fully assured that the latest character assigned to the still somewhat dubious *D. ellipticum* is no character at all ; but my reasons for thinking *D. patulum* distinct from the Californian plant described by Elias Durand under the former name are, first. that the character of the androecium is so peculiar. and secondly, the habitat ; for his plant came from the Sierra Nevada. mine is seemingly restricted to low and more or less alkaline soil in the region of the plains. Nevertheless, I sent this plant to Dr. Gray many years ago, from Sacramento, and believe he has included it in his *D. ellipticum*. I will here also record a suspicion I feel, tha the real *D. ellipticum* of Nuttall's manuscript, which was not from California at all, but from many hundreds of miles further north, and from a widely different climatic region, will be found identical with *D. Hendersoni*.

DODECATHEON CRUCIATUM. A foot or more in height, somewhat slender, glabrous, the inflorescence only very slightly glandular, deep green, the scape and involucral bracts finely purple-dotted: roots mostly, or wholly, dying after the flowering period, the minute tubers formed above them independently: leaves far less numerous than in the preceding, fleshy and depressed, the broadly oval entire lamina tapering to a broad petiole of more than its own length: flowers always 4-merous: corolla of a rich deep reddish purple except a yellowish ring above the dark purple base: androecium elongated, fully 3 lines long; filaments joined into a tube which is dark purple throughout, the external raised appendages composed of a mass or irregularly sinuous folds; anthers dark-purple, 2 lines long, linear, somewhat narrowed at the abruptly notched apex, erect, neither divergent from nor convergent around the exserted style: capsule cylindrical, circumscissile at top; seeds obscurely polyhedral, amber-colored, distinctly favose-reticulate.

This is the common species at and about San Francisco, extending southward to Monterey, perhaps Santa Barbara, and eastward to Mt. Diablo. In Humboldt County it is replaced by that which I leave under the name *D. Hendersoni*, notwithstanding my expectation that it will prove to be the real *D. ellipticum*. And that northern plant differs from *D. cruciatum* in its propagation by root-metamorphosis; flowers always 5-merous: corollas light rose-purple without yellow; anthers proportionately longer and quite acute; moreover, its involucral bracts are broader, shorter, and far more numerous.

DODECATHEON CLEVELANDI. A foot or two high, pale green and glandular: new roots formed not at the end of the dry season but at its beginning, remaining dormant through the summer, no tubers formed either originally or by root-metamorphosis: leaves scarcely fleshy, not depressed but ascending or erect, spatulate-obovate, the margins erose: flowers 5-merous: corolla bright-purple with a yellow base and some

dark-purple spots next the androecium : androecium about 3 lines long, filaments connate, the tube dark-purple, the ornate exterior of each filament changing to yellow at the base of the anther and continued up the back of it nearly to the apex in a lanceolate form and lying in irregular folds : anthers otherwise purple, not quite twice the length of the staminal tube, slightly divergent around the moderately exserted pistil, retuse at the rather blunt apex : capsule oblong, circumscissile at top : seeds reddish-brown, somewhat cubical, the **testa sinuously reticulate.**

The common species on dry hills and mesas in the southern part of California, about San Diego and San Bernardino. It is confused with *D. Jeffreyi* in the Revision. It agrees with that species in root character and in the attitude of its foliage, but is totally distinct : for that species belongs to the high mountains of California and Oregon, the climate and soil of which are as unlike what are found in southern California as can well be imagined : and its capsule opens really by valves, not by an operculum. But the most striking peculiarity of *D. Clevelandi* is, that notwithstanding the excessively long period of drought its roots have to endure in that climate, they do not change to tubers, but are perfetly and normally renewed before the beginning of the long summer, remaining shrivelled and dormant until autumn, and are found firmly attached to the crown even in the midst of the long summer drought. This fact I first observed in specimens (if they be of the same species) which I collected in fruit, in August, on Santa Cruz Island. The more recent study of the plant has been made, with Mr. Cleveland's intelligent and invaluable assistance, during the past year; he having communicated living plants in abundance, at different stages of growth and maturity. Excellent herbarium specimens from near San Bernardino by Mr. Parish will probably be found supplementing those of Mr. Cleveland in the various herbaria.

New or Noteworthy Species.

III.

Lupinus malacophyllus. Annual, erect, a span high, with a few ascending branches from the base; soft throughout, with a long white villous pubescence: leaflets 5 to 7, obovate-lanceolate, obtuse, less than an inch long, the petioles 2 inches: racemes verticillate, at least below, 3 inches long or more, on peduncles nearly as long: calyx-lips very unequal; the upper short, scarious, slightly notched; lower greatly elongated, green-herbaceous, distinctly 3-toothed: corolla ½ inch long, light blue and dark purple; keel moderately falcate, naked: pods sparsely villous, 2-seeded: seeds orbicular, white.

Dry hills, near Verdi, Nevada, 2 May, 1888; collected by Mr. C. F. Sonne. An exceedingly pretty species, although related to the homely small-flowered *L. pusillus* and *L. brevicaulis*, but with its showy verticillate racemes of large flowers, and its long soft pubescence, not likely to have been confounded with either.

Lupinus ligulatus. Perennial, the stems clustered, simple, erect, stout and somewhat fistulous, 2 to 4 feet high, glabrous and a little glaucous: other parts of the plant, except the upper surface of the leaves, more or less hirsute-pubescent: stipules an inch long, adnate for something less than half their length, the elongated linear acuminate free parts strongly villous-hirsute; petioles 3 to 5 inches long: leaflets about 9, oblanceolate, acute, an inch or two long: raceme short-peduncled, 6 to 10 inches long; the bracts villous-ciliate; flowers rather distinctly verticillate, nearly ½

inch long; keel falcate, densely ciliate in the middle: ovary very villous.

Crooked Creek, in the southeastern part of Oregon, July, 1886, Mrs. R. M. Austin. Species near *L. rivularis*, but distinguishable at a glance by the stout hollow stems, and especially by the remarkably conspicuous liguliform stipules, of which the lowest are an inch and a half long; all very hairy. The color of the flowers, which are faded in the specimens, is probably blue.

LUPINUS VARICOLOR, Steudel, Nom. (1841) — *L. versicolor*, Lindl. Bot. Reg. xxiii. t. 1979 (1837) — *L. Franciscanus*, Pittonia, i. 64 (1887).—And so this beautiful and quite local Californian lupine was known to Lindley, whose figure from a specimen cultivated in England I had quite overlooked. East American authors are more or less excusable for losing sight of any number of our species; not so we who live in the field. The present plant may not have been known to Steudel except through Lindley's work; but he discovered that the Lindleyan name was precluded by an earlier and Mexican *L. versicolor* of Sweet.

PTELEA CRENULATA. Ten to twenty-five feet high, strongly aromatic when fresh, but with an agreeable spicy odor when dry, glabrous except the tomentulose flowers and a faint pubescence on the lower face of the leaves: mature leaves of a bright yellowish green beneath, darker above; leaflets obovate with abruptly cuneate base, obtuse or acute, 1 to 3 inches long, crenulate, or crenate-serrate and the serratures crenulate: filaments villous near the base: samara, including the broad wing, $\frac{3}{4}$ inch long and of somewhat greater breadth, in maturity truncate or emarginate at both ends, frequently triquetrous and 3-seeded.—*P. angustifolia*, Brew. & Wats. Bot. Cal. i. 97, not of Benth.

I am too familiar with the Mexican *P. angustifolia* to confound our Californian species with it. The present shrub has more nearly the foliage and aspect of the East American

P. trifoliata; but both that and the Mexican one have an offensive mephitic odor; the Californian when fresh is only strongly aromatic, and its leaflets are broader and not pointed, or less so by far than those of *P. trifoliata* even, not to name the narrow and entire ones of that Mexican and Texano-Neo-Mexican species of which the Benthamian name *P. angustifolia* is probably but a synonym of the much older *P. tomentosa*, Rafinesque, Fl. Ludov. 108 (1817).

TROPIDOCARPUM CAPPARIDEUM. Annual, hirsute-pubescent, the branches few, decumbent, 6 to 12 inches long, very loosely racemose throughout: pedicels slender, spreading or ascending, often more than an inch long, all axillary to pinnatifid leafy bracts: pods linear-oblong, 8 or 9 lines long, 2 lines thick, obtuse at each end, tipped with a conspicuous style, widely inflated (the cross section transversely elliptical), 2 lines in diameter, conspicuously 6-nerved or almost -ribbed, partition wholly wanting; valves 4, those of the broad side deciduous at maturity, the other two persistent, united above by the style: placentæ and seed-rows 4, one along each margin of the broad persistent valves.

Very common in the low and somewhat alkaline valley lands skirting the San Joaquin River, in Contra Costa County, California, where it was collected by the writer, late in March of the current year; the type of the genus, *T. gracile*, with its flat linear nerveless 2-valved pods, being common in the hilly districts which lie back from the river.

If it had been the present remarkable plant which had first fallen into botanists' hands, the genus would probably have taken its place among the Capparidaceæ rather than with the Cruciferæ; for the pods are extremely like those of a *Capparis*, and nothing at all resembling them has, in so far as I am aware, been hitherto admitted into the Cruciferæ; but the flowers are strictly tetradynamous.

STREPTANTHUS BARBIGER. Annual, erect, slender, a foot high, loosely racemose-paniculate, glabrous throughout, except

the calyx: leaves linear, entire: flowers subsessile, 4 lines long; sepals nearly equal and alike, greenish white with white tips, clothed with a short bristly white pubescence: petals white: stamens in three very unequal pairs; filaments dark purple, the uppermost pair united almost to the summit: anthers linear-sagittate, white: pods narrowly linear, recurved.

Collected at Highland Springs, Lake County, California, June, 1888, by Mr. Arthur B. Simonds. A plant with the slender habit of the rare *S. polygaloides;* but the flowers of totally different character.

ERIGERON SONNEI. Stems a span high, solitary, slender, erect, apparently from horizontal running rootstocks: whole plant strigillose-canescent: leaves mostly at base of stem, 2 or 3 inches long, lanceolate, narrowed to a petiole which is dilated and half-clasping at base: peduncle solitary, scapiform, remotely bracted, usually monocephalous: involucre campanulate, less than a half-inch high, the bracts subequal, in about 2 series: rays 9 to 12, broad, purplish.

Western slope of the Washoe Mountains, Nevada, 22 July, 1888, Mr C. F. Sonne. A plant which, like several other species of the West American mountain districts, may almost as well be placed in the genus *Aster* as in *Erigeron*, having the few and broad rays of the former, but the involucre of the latter. The specimens are too young, but there is an enlargement of the nodes at the base of the stem which would seem to indicate that bulblets are ultimately formed in the leaf-axils.

ERIGERON PETROPHILUS. Canescently hirsute-pubescent, except the dark green and somewhat glandular inflorescence: stems clustered from a suffrutescent base, ascending, a foot high or more, rigid and brittle, very leafy up to the loose terminal cymose panicle: leaves linear-spatulate, obtuse, entire, an inch long: involucre turbinate, the numerous and very unequal bracts closely imbricated in several series: rays

none: pappus of many unequal persistent and not fragile bristles.

Inhabiting rocky summits of the Californian Coast Range. from near Berkeley, where it was discovered by the writer in the summer of 1881, to Mt. St. Helena and the whole adjacent mountain region; also southward in Monterey County, whence it was sent, in a very densely leafy and almost white-pubescent state, by Mr. Hickman, in the year 1887; flowering in August and September. The plant recedes greatly from all ordinary types of *Erigeron* in its autumnal flowering, and more especially in its very multiserial and closely imbricated involucral bracts; these appearing in as many series as in any species of *Aster*. It is nevertheless but one of a group of several very peculiar Californian species of *Erigeron*; *E. angustatus*[1] having quite as imbricated an involucre; *E. resciduus*,[2] which, although with fewer and less imbricated bracts, is the nearest ally of the present plant, and *E. inornatus*; all four being leafy and discoid perennials of peculiar habit, and autumnal in their flowering.

CACALIA PALMERI Two feet high, stem simple up to the corymbose summit, scapoid, striate, very slightly tomentose-pubescent, the leaves equably so on both faces: leaves few and sub-radical, from broadly ovate to almost orbicular, cordate, obtuse, with shallow sinuate and mucronately denticulate lobes, 3 to 6 inches long, of coriaceous texture, the petioles stout and nearly as long: heads small, few-flowered, crowded in cymose terminal clusters: flowers apparently white.

Rio Blanco, State of Jalisco, Mexico, 1886. Dr. Edward Palmer (No. 168). *C. lassilaginoides*, to which this has been hastily referred, has broadly reniform and multifid leaves which are white-tomentose beneath: therefore about as different as possible from those of this new species.

1. Greene, Bull. Cal. Acad. i. 88.
2. Pittonia, i. 174.

SENECIO APHANACTIS. Annual, slender, 2 to 5 inches high, slightly arachnoid about the inflorescence, otherwise glabrous, scarcely viscid, scentless: leaves $\frac{1}{2}$ to $\frac{3}{4}$ inch long, somewhat fleshy, firmly erect or ascending, the lowest linear-spatulate, entire, lower cauline from linear to oblong in outline, coarsely toothed or simply lobed: heads very small, 2 or 3 terminating the simple stem, or as many at the end of each of the 2 or 3 lax branches: involucre subtended by 2 or 3 minute bractlets, its proper scales linear-acuminate, without black tips: rays about 5, minute, recurved: achenes appressed-silky-canescent.—*S. sylvaticus*, Gray. Bot. Cal. i. 410. not of Linn.

Indigenous and rare on clayey or gravelly open hill-tops of the Mt. Diablo Range in central California. Most related to the common *S. Californicus*, and, although heretofore inadvertently allowed to pass as if a mere depauperate state of *S. sylvaticus* introduced from the Old World, it is very unlike that species in most respects; for that is a rank gummy ill-scented coarse weed, with flaccid and spreading divided and subdivided ample foliage, and a large terminal corymb of heads which have twelve to fifteen not inconspicuous rays; its achenes not silky-canescent, but powdery-puberulent. I have collected *S. aphanactis* only twice in all my years in California: once, in 1874, on the clayey and barren southern escarpment of Mare Island in San Francisco Bay, and again, in March of this year, in similar ground, near Byron Springs east of Mt. Diablo.

SENECIO HYDROPHILUS, var. PACIFICUS. Stouter than the type, with more and ampler radical, and fewer cauline leaves: heads about twice as large and wholly destitute of rays: inflorescence very pronouncedly, and in age loosely, cymose-corymbose (that of the type being thyrsoid-paniculate).

Frequent in either fresh or brackish marshes near the Bay of San Francisco: so unlike the typical plant of the far off interior of the continent, that it may eventually be concluded specifically distinct. The stems are clustered, decumbent at base, of a rich red-purple covered with bloom, and, occupying

considerable tracts of ground, as it does, the plant is of some beauty when seen growing.

LASTHENIA CONJUGENS. Annual, slightly succulent, a span high, puberulent: lower leaves narrowly linear, entire; the rameal with 1 or 2 pairs of narrow and elongated segments, these entire or sometimes with a few salient teeth: heads pedunculed; involucral bracts ovate, acute, slightly joined at base into a shallow cup; rays numerous, showy: achenes of a shining olive-green color and perfectly glabrous: pappus none.

Moist flats along the river at Antioch, Contra Costa County, California; collected by the author, April 17, 1887. With the achenes, and the general aspect of a *Lasthenia*, the involucral scales are so nearly distinct that the species might just as well be referred to *Baeria*. It would be likely to pass for a low and somewhat fleshy state of *B. Fremonti*, at first sight: but there is no member of that genus with such an achene. Nevertheless, the two genera are no longer naturally separable.

CAMPANULA AURITA. Root perennial: stems several, a span high, erect, slender, leafy, 1-flowered: the whole plant pale and minutely scabrous: leaves an inch long, oblong-lanceolate, acute, sessile by a narrow base, entire or with a few coarse teeth: segments of the calyx lanceolate, each with a pair of erect lobes or teeth at or near the base: corolla violet, $\frac{3}{4}$ inch long, cleft to some distance below the middle, the segments lanceolate, widely spreading.

A well marked and interesting species obtained on the table-lands of the Yukon River, Alaska, latitude 63, late in August, 1881, by Mr. Octavius S. Bates.

COLLOMIA RAWSONIANA. Stems clustered, from perennial rather slender horizontal roots, or rootstocks, a foot high or more, sparingly branched, softly viscid-pubescent: leaves 2 or 3 inches long, thin and bright green, broadly lanceolate,

acute, cuneate and entire toward the sessile base, otherwise coarsely and incisely serrate; flowers glomerate at the ends of the branches: calyx-lobes lanceolate-acuminate, longer than the campanulate tube: corolla from bright salmon color to orange, an inch and a half long, tubular-funnelform, the segments oblong-lanceolate, very acute: filaments a little exserted and conspicuously declined.

A most beautiful plant, by far the finest of its genus, discovered in the higher valleys of the Sierra Nevada, in Fresno County, California, by Mrs. L. A. Peckenpah (*nēe* Rawson); said to be abundant in its locality: intermediate, in aspect and character, between *C. heterophylla* and *C. debilis*. The lobe-like folds in the sinuses of the calyx, which mark so well the genus, come out plainly in this, but are not so large as in some smaller species.

Lycium Hassei. Glabrous but slightly viscid, compactly branching and somewhat spinescent, 8 or 10 feet high: leaves spatulate, obtuse, an inch long: flowers 4-merous or 5-merous; calyx-lobes 2 to 4, foliaceous, oblong or lanceolate, unequal, much longer than the campanulate tube; corolla ½ inch long, narrowly funnelform, the oval lobes spreading, light purple with a greenish tinge: stamens well exserted: berries small, globose, scarlet.

Santa Catalina Island, July 15, 1888; a single dense clump consisting perhaps of one or possibly several bushes, the whole mass as broad as high and quite impenetrable: collectors Dr. H. E. Hasse and Mr. William S. Lyon of Los Angeles.

Sonnea foliacea. Two to four inches high, with stoutish ascending branches from the base, leafy throughout and strigose-hispid: leaves an inch long, the lowest spatulate-oblong, the cauline oblong or oblong-lanceolate: flowers small, solitary or glomerulate in the axils of the leaves and at the ends of the branchlets: nutlets usually solitary, sometimes a pair, ovate-acuminate, inserted just below the apex

and inversely ascending, *i. e.*, the basal end uppermost, and that distinctly favose-reticulate, the whole surface hispidulous, the back with an ovate depression surrounded by a slightly raised and somewhat denticulate margin and traversed in the middle by a more or less prominent ridge, the cartilaginous yellowish caruncle double, or at least deeply 2-lobed.

Western slope of the Washoe Mountains, Nevada, July 22, 1888, Mr. C. F. Sonne.

This is about the most interesting of Mr. Sonne's many new discoveries in this alliance of plants; and, while the species confirms the genus *Somea*, and most resembles *S. hispida*, its nutlets recall those of *Omphalodes* in their excavated, or at least, much depressed dorsal part. The singular double caruncle will be taken as indicating that two nutlets have become one, and this organ, which is as much of the nature of a stipe as of anything, alone remains disjoined.

PHACELIA SUAVEOLENS. Annual, stoutish, freely branching from the base, the branches ascending, a foot or two long: herbage very sweet-scented, soft pubescent and glandular-viscid throughout: cauline leaves oval, coarsely-toothed, an inch long, on slender petioles of nearly equal length; the lower with some lyrate lobes at or below the base of the main blade: racemes solitary or in pairs, elongated, dense: calyx-lobes spatulate, entire, $\frac{1}{4}$ inch long, exceeding the 4-seeded capsules: corolla bright blue, narrowly funnelform, $\frac{1}{2}$ inch long, the limb one half as broad: seeds oval, black, deeply favose-pitted.

Plentiful at the Petrified Forest, Sonoma County, California; collected by the author late in August, 1888. It is another of those species which eliminate the boundaries of subgenera or sections; for it combines the capsule and seed of Euphacelia with the narrow elongated corolla of Microgenetes.

The delightful fragrance of the herbage, inhering in ever the well dried specimens, is almost new in the genus: most of the species yielding a disagreeable odor.

Pages 215 to 230, issued Oct. 18, 1888.

PHACELIA ARTHURI. Annual, diffuse, the stoutish branches 2 feet long or more: herbage not viscid, setose-pubescent, the inflorescence hispidulous: leaves loosely pinnate, or some lyrate, the lobes crenate-toothed: spikes numerous, solitary in the leaf-axils, and very short-peduncled: flowers crowded and biserial: calyx-lobes entire, very unequal, four of them small and at length partly enfolded by the accrescent rhombic-obovate acute outer one: corolla very small, open-campanulate, about a line and a half broad, light blue: stamens not exserted.

Discovered growing in a by-street toward the western part of the city of Oakland, in 1887, by my former pupil, Mr. Arthur B. Simonds. The capsule and seeds are unknown; for the plant appears to have been sterile. It is nevertheless pretty clearly of the Euphacelia section of the genus; doubtless indigenous, and a local plant singularly preserved in the midst of a city, where it is now on the verge of extinction. Strangest of all is the fact that it is a very near relative of *P. scabrella* (Pittonia, i. 35), which is endemic on a small island two hundred miles or more down the coast. In that species I had noted an inequality in the sepals. It is a good deal more pronounced in the present plant, where the enlarged outer ones lie imbricated over one another up and down either side of the spike in such a way that one at first will be liable to mistake them for bracts.

RIBES VICTORIS. A somewhat slender spinescent shrub, 5 feet high, younger branches very prickly, young growing parts puberulent and somewhat viscid: leaves an inch broad, 3 to 5-lobed, on slender petioles subtended by not very stout triple spines: pedicels with 1 or 2 persistent entire bracts and as many large nodding greenish white flowers: calyx-lobes linear-oblong, recurved: petals acutish at apex, and erose-toothed: filaments not exceeding the petals; anthers ovate-oblong, broad but not sagittate at base, obtusish at apex but not mucronate: ovary glandular-hirsute: fruit unknown.

Collected near the base of Mt. Tamalpais, in Marin County, California, by Mr. Victor K. Chesnut, a pupil of mine to whom I gladly dedicate the species; also by Dr. C. C. Parry, in Rutherford Cañon, Napa Valley, in May, 1887: nearly related to *R. Menziesii*, but with very different petals and anthers. It is perhaps no great rarity in that botanically almost unexplored range of mountains which separates the Santa Rosa and Napa Valleys.

For SEDUM FORRERI (Pitt. i. 162. Feb. 1888), to which I at first inadvertently gave the homonym *S. divergens*, there is already a synonym; it having been republished by Dr. Watson as *S. Pringlei* (Proc. Am. Acad. xxiii. 273. May, 1888).

CALOCHORTUS VENUSTULUS (Greene, Pitt. i. 158, Jan. 1888), is also as promptly furnished with a synonym, it being *C. Madrensis* of Watson, in the article just cited.

Mr. Pringle's specimens are better than those of Mr. Forrer (which latter were all I had at first), in that they show the real color of the well dried flower to be orange-yellow, rather than cream color; but there is one badly faded perianth upon one in my set of Pringle's collection, and this exhibits the very shade I had described.

EPILOBIUM OREGANUM. Perennial (?), erect, stout, apparently 3 feet high, the stems terete, glabrous leafy, and glaucescent up to the slightly puberulent inflorescence: leaves opposite (except the floral), sessile, lanceolate, closely denticulate, 2 or 3 inches long: the floral smaller and alternate: corolla deep purple, nearly an inch broad; the deeply obcordate petals much exceeding the sepals: fruit unknown.

Springy places, at Grant's Pass, Oregon, July, 1887; collected by Mr. Howell, and distributed under the name of *E. glaucum*, but it is not the South American species of that name.

Concerning the Making of Many Synonyms.

A significant proportion of that burden of them, under which the literature of botany already labors, is directly chargeable to the loose and apparently only half serious manner in which the binomial system, so long in process of evolution, was at last offered to the scientific world for its acceptance; for it made its full appearance based on no set of enunciated principles; subject to no formulated rules. It was left to shape its own uncertain course according to the various and conflicting notions of differently minded individuals.

Linnæus liked well to occupy the lawgiver's seat in science. Why did he fail to legislate for that method of nomenclature which proposed to make universal? He could have ordered that the specific name should be considered permanent; and doubtless all the world would have acceded to the proposition, and so, synonyms by the thousand which now confront us, would have been kept out of existence. Why did he, the careful systematist, have so many loose threads? Perhaps he did not forecast the dangers; could not foresee that a binomial nomenclature, making species so easily handled, also opened a door to the easy making of many synonyms. The only precautionary hint which I know of his having put forth upon this point, is that in the preface to the first edition of the Species Plantarum, in which he speaks of the confusion which will ensue if men attempt to place in the rank of species. and give specific names to multitudinous forms which he has placed in the lower rank; the very thing which a subsequent generation found it incumbent on them to do, in order to disentangle the Linnæan confusion of species. Almost all the

Linnæan varieties are now, and have long been, accepted in the rank of species.

If Linnæus did not perceive that, under this system of short and easy names, synonyms would be likely to multiply like grasshoppers and be a burden, it may have been partly because of his curiously inadequate notion of the size of this planet, and of the number of forms of life extant thereon. He verily thought that no more than two or three thousand plants remained to be discovered and added to his seven thousand; and he no doubt expected that most these species, as they came along, would severally fall, each with its one new specific name, into the various genera already named and defined by himself.

His confidence in the immutability of the boundaries of genera as he had drawn them was another characteristic of his great but egotistic mind. He did not think that future botanists would, in a body, treat some of his genera as natural orders, and hundreds of his species as types of genera. But he lived long enough after the year 1753 to realize that such things were not beyond the range of possibility. He saw some of his genera broken up into several; other twos and threes combined in one; but he had probably a poor opinion of the botanists who proposed such changes. They may have been, in his estimation, what Rafinesque was in the eyes of a past generation of North American botanists. But, at all events, and this is what I wish chiefly to call attention to, he lived to see his genera in some cases divided, and the species transferred. What was the usage of these contemporaries of Linnæus in respect to permanency of the trivial or specific name of a plant? Crantz, Miller and Scopoli are the very earliest exemplars of a transference of binarily named old species to new genera. They seemed to hold themselves, as bound by law, to the retention of the old trivial name. Had Linnæus in any way indicated that, in these alterations of generic names, or rather, generic limits, the old trivial names must be kept? Possibly so. It would manifestly prevent that confusion in science which Linnæus, while often

contributing to it himself, held sufficiently in abhorrence. But, more probably, men of such originality of thought, clearness of perception, and of such logical force, as Crantz and Scopoli, needed no hint from another, to impel them in the direction which they took. The principle of priority, be it remembered, was one which the men of those times respected most deeply; and Linnæus' frequent disregard of it was one of the most effectual weapons in the hands of his adversaries.

But, even a year before Scopoli adopted binomialism in his second edition of the Flora Carniolica, Linnæus himself, in the Mantissa Altera, had altered the limits of a few genera, such as the merging of the large genus *Leucadendron* in *Protea*, and so had been obliged to show what his mind was. If he had not before in any way indicated to Crantz and Miller the course they had taken, he followed their practice when now his own turn had come; for he, I believe uniformly, makes new combinations only, avoiding the introduction of new specific names. Had he felt that no violation of important principle was involved in the action, he could now have put an end to the use of so ridiculous a specific name as that which he had, at the first, burdened his *Leucadendron Hypophyllocarpodendron*. If permanency was not a matter of principle, now was the opportunity to have altered it into something like what we now have from Willdenow, *Protea Hypophylla*. But no: so entirely does he seem to hold by the doctrine of the necessary perpetuity of the specific name first given, that he writes *Protea Hypophyllocarpodendron*, apparently nothing doubting that that will continue to be the name of the species forever.

Complaint is made, in some quarters, against the practice of restoring old and long neglected specific names. But how studiously do not the complainants avoid any approach to the real point at issue? It is merely begging the whole question to urge that the taking up of the oldest name under the proper genus, is going far enough. But that complete evasion is all we get in answer to our appeals for light; save only the

one objection made, that restoring old specific names increases synonymy.

At this late day, when synonyms are already so multitudinous that no standard authors attempt to give them all, or even more than one or two of the leading ones, and when the whole subject is left, or soon must be, to bibliographers and index makers, the matter of a few more is a thing of small importance, so long as we are progressing a little in the direction of fixed names for species. That is a consummation so desirable, for many a reason, that by the side of it, the making of a few score synonyms for bibliographers to amuse themselves with, sinks into insignificance.

But, the outcry against new synonyms comes loudest from that very shore whence there is soon to be sent forth upon the sea of plant lore, such a cargo of them as was never before got together in a single generation, or bound up in successive volumes under one title. The new Index, or Nomenclator, much talked about and oftener wished for, will inevitably create new synonyms almost by the thousand. As we understand it, all the known species of plants are to be named after the generic limitations of Bentham and Hooker's great treatise. Now it is accepted generally, or ought to be, that, however useful such a work as the Genera Plantarum must be, its authors' decisions about the limits of genera, cannot be received as final. Their work is done in an herbarium; and the plant world has not been so made that its problems can be mastered by mere dealing with cords upon cords of dried specimens, which are often wretched fragments. No respectable author of a local flora, no master of the vegetable products of one state or country, familiar with the plants and trees themselves, ever yet proved himself able to adopt the genera or the species as set forth in great general works. It is a principle recognized by the greatest botanists, that the final authority upon a genus or a species is the man who has dwelt and labored in the field where the several genera and species are indigenous. No botanist in North America, or in South America, in Australia or Hawaii, in Japan or Persia,

will ever be likely to accept the genera of plants in his district according to the definitions and limitations of even such great masters of general botany as the authors of the Genera Plantarum. This circumstance, although a most certain fact in my own view, is one which I should not have put forth if the greatest men had not freely conceded its truth. If true, it will justify my statement that the great work on synonomy "which is steadily approaching completion"[1] is sure to be more productive of mere empty synonyms, than all other books and papers that have been printed in the last half-century.

But there is another treatise upon genera, younger than that of Bentham and Hooker, which is approaching completion; one in which the genera of the world are assigned very different limits from those fixed by Bentham and Hooker. I refer to Baillon's Histoire; a work which, for scholarship, and the care and skill with which the plant world has been investigated, and that originally, by the illustrious author of the treatise, will give it weight on the continent of Europe which will counterbalance the influence of Bentham and Hooker in Britain and North America. But almost hundreds of the genera allowed by the authors last named. Baillon reduces, and that with a display of facts and arguments which almost drive us, against our will, from our old prejudices concerning the great number of plant genera. Now, what of the synonyms that will follow, in case some zealous friend and countryman of M. Baillon shall provide for the renaming of all plant species after Baillon's genera? I refer to this only to show that there is a tinge of unconscious injustice in the outery made against the botanists who make a synonym or two a month by restoring an old specific name. These few scarcely add so many drops to the ocean of synonymy in which we are by and by to be deluged.

Let me, in conclusion of these paragraphs, foreshadow one more terror, for those of our friends who so greatly dread a few new synonyms. There seem reasons for suspecting that,

1. Journ. Bot. xxvi. 262.

before the world is another century old, a protest once loudly made by such noble men as Miller, Haller and Mœnch, against Linnæus' audacious rejection of old generic names, will be renewed, and perhaps successfully; that the real founder of genera, whom some of his contemporaries in England were wont to style Dr. Joseph Pitton, will receive literary and scientific justice; that many genera of plants will be re-invested with the names originally given them by Tournefort and other early botanists; that *Rumex* and *Euphorbia*, for example, will be displaced in favor of the older and long universal *Lapathum* and *Tithymalus;* that *Cypripedium* and *Tournefortia* will be superseded by *Calceolus* and *Pittonia*. This may seem but a wild prediction to those whose eyes are closed to the tendencies of our day. But the author of these papers was long ago so convinced that a concerted action in this direction will yet be made, that he ventured to hint it, as he supposed, in the general title which these pages bear. But before such time shall come, the scientific world may have learned that only in a very limited way need descriptive botanists be troubled with synonyms; and that to have created a few of them, in his time, will not in any author be reckoned a great fault, provided that by so doing he helped the world a little on its way to thorough fixity in the scientific names of things.

Concerning the Citation of Authors.

Many things are being said just now, upon this topic, in the current botanical serials. While the subject is thus apparently under special consideration in several minds, we would fain add a few more suggestions.

The vanity of botanists who wish to see their own names appended, parenthetically even, if not otherwise, to every

species in the naming of which they have had part, is mildly but very fitly reproved in Mr. James Britten's late remark: "We have always held this question of 'credit' to be purely sentimental."[1] We ourselves do not consider a parenthetic author's name a thing of any value, and we have always had an aversion for the parentheses, but justice seems to require that we respect our neighbors' possessions according to his own estimate of their worth, not ours. If a man wishes "credit" for a specific name, or for a new combination, it should be accorded, it seems to us, without our waiting to know whether his wish is born of vain glory or of a worthier motive; and the stronger objections against the parentheses are those offered by M. De Candolle.[2] I doubt if even these will seem sufficient to justify the omission of them, so long as authors' names are appended closely to the plant-name and separated from the place cited, as is done in most modern books.

The practice of citing Bentham and Hooker as authorities for binomials in genera which they merely combined without touching the specific nomenclature, is one which began at Cambridge in this country under circumstances to which we have heretofore made allusion.[3] This usage, appearing as it does in one or more of our standard works, is likely to be kept up by that class of botanical writers in America who never take thought for themselves in any such matter, but follow blindly the leading of others. I have elsewhere adverted to Dr. Gray's elaborate paper in which he condemned his own earlier practice. It may be well to set forth one or two of the plainest reasons why "Benth. & Hook. f." may not rightfully be credited with names which exist in their great work, not actually, but by implication only. These authors undertook a new edition of the natural orders and genera of flowering plants, intending to avoid all dealing with species

[1] Journ. Bot. xxvi. 258.
[2] Journ. Bot. xxvi. 290.
[3] Pittonia, i. 192.

whether by name or definition. The enterprise was great. The need of such a work, summing up all the known genera, was pressing. Had they attempted to enumerate the species under each genus, the close of the current century would not have seen the work completed. The proper characterization and right naming of all the thousands of species in all the genera, a piece of work almost incalculably great, was left, necessarily, to other hands. But the crediting of Benth. & Hook. f. with species, which they purposely let alone, presupposes that the men who accomplish this great work must freely hand over to those authors the credit of their own toil; a manifest absurdity. For an illustration of the way in which authors of a Genera Plantarum are obliged, for want of time, to avoid the whole matter of specific nomenclature, let any one consult page 38 of the eighth volume of Baillon's Histoire. Among several genera which this celebrated author would reduce to *Hysterionica* there is *Grindelia;* but his page exhibits a figure of the plant known to us in America as our *Grindelia squarrosa.* Since the author will include in *Hysterionica* not only *Chrysopsis* and *Aplopappus*, each with many species long since named, but several more, a question arises as to whether the specific name *squarrosa* which this *Grindelia* bears, can be adopted in *Hysterionica*, or whether there may not be an older *squarrosa* in *Aplopappus* or somewhere else, which will rule it out. By taking time enough he can decide the matter; and since, on account of the figure on his page, he must indicate what plant is represented, he perhaps ought to go into the specific nomenclature of his *Hysterionica* far enough to settle the question. But he will not. He is not naming species. He is discussing genera; so over his figure he prints "*Hysterionica* (*Grindelia squarrosa*)", which, being interpreted is: "that species of *Hysterionica*, whatever its name may be under that genus, which men have hitherto known as *Grindelia squarrosa.*" Bentham and Hooker, figuring no species, have largely avoided what has been Baillon's frequent necessity, of touching specific nomenclature; and the former have in so far abjured all needless mention of

species by name, as to have published some new types in the rank and character of monotypical genera, leaving the plants entirely destitute of any other than generic names. In this they were perhaps unconscious of having renewed a practice which was common with pre-Linnæan authors.[1] For a single example of this I may cite *Chionopappus*[2] which, published as a genus now several years since, may, in so far as we know, await a specific name at the hands of Mr. Jackson, at some time still in the future. But it would be erroneous to say that "Benth. & Hook. f." are not to be cited as authors of specific names in any case; for in their work some species have been named by them very explicitly. One out of many such instances will be found on page 249 of the second volume, where, in transferring *Gutierrezia gymnospermoides* to *Xanthocephalum*, they have incidentally printed what will be its new name, in their clause which ends with "in *X. gymnospermoide*." Cases like that one must not ignore; for it is an explicit re-naming of the plant. Some one of our contemporaries has lately remarked, with great pertinency, upon the folly of conceding names by implication, to authors who, like Bentham, did not admit the obligation of retaining old specific names under new genera. It is most plain that he who writes, for example, "*Potentilla Gordoni*, Benth. & Hook.", upon no other warrant than that those authors have pronounced the genus *Iresia* to be but a group of *Potentilla* species, is declaring that they were bound to adopt the specific name *Gordoni* in case they had named the several species under *Potentilla*; so if Dr. Watson had written nothing botanical except his valuable Index, we should feel certain that he held the doctrine of the necessary permanency of the specific name. Under *Horkelia* and *Iresia* he has done up nicely the synonymy, and has made Bentham and Hooker the authors of such synonyms as they would have made under that law of permanency which all the world knows they do

[1] See page 189 preceding.
[2] Benth. & Hook. f. ii. 485.

not respect; but when he comes to an *Ivesia* or a *Horkelia* the specific name of which is found pre-existing in *Potentilla*, there he stops; for he can not guess what names Bentham and Hooker would have proposed for these species. But, for reasons above stated, no more does he know that they would have written *Potentilla Gordoni* or *P. congesta*; and every one of these synonyms ought to be erased from the Index, as specimens of false bibliography. The authors in question have nowhere made or proposed the names which this book, as it stands, attributes to them; but the pages of the Index adverted to serve to show that the author, at least sometimes, gives allegiance principles of priority and permanency.

We are not at all able to understand why protest should be made against referring accepted and familiar binomials to their actual authors, even when pre-Linnæan. If so eminent a botanist as Baron von Mueller writes *Ranunculus aquatilis*, Dodoens,[1] thus citing the true author of that well known plant-name, what literary or scientific fault has he committed? He has said that, not Linnæus, but an author of some two centuries earlier proposed that name and gave it that currency which it still holds; but he has only said the simple truth; he has taken no departure from principles of priority, has made no synonym. He is even most literally faithful to Linnæus, who did not arrogate to himself that binomial, but acknowledged Dodoens to be its author, citing the page of the Pemptades.[2] We are not aware that aught has been done, or proposed, in Australia or North America, to call forth from our friends and fellow laborers in Britain, such a note of alarm as the following: "The binomial method, the reduction of nomenclature to a system, is one of the greatest of the reforms introduced by Linnæus, and the attempt to deprive him of it is not likely to be sanctioned by botanists."[3] The honor due to Linnæus, as to the man who reduced nomenclature to a

[1] Census of Australian Plants, p. 1.
[2] Linn. Sp. Pl. ed. 1. p. 556.
[3] Journ. Bot. xxvi. 262.

system (if such honor be strictly his), will not call for his being credited with the scores of binomials which he not only did not make, but which he found already made, and long in common use.

To say that "these names being composed of two words only is a mere accident," is perhaps not speaking very accurately; yet, granting it to be so, what force is there to the argument? Are not the greatest of discoveries, and the most serviceable inventions, commonly due to what is called accident? It was doubtless by mere accident that the old botanists discovered that, when conversing about this or that species, they could avoid the long descriptive phrases of the books, and yet perfectly understand one another, by using only two words selected from the phrase. There was, for instance, the old descriptive phrase, *Ranunculus pratensis erectus acris* (Bauhin); but for oral purposes, it was enough to say *Ranunculus acris*. If this last was sufficient for an intelligible conversation about the plant, it was enough for a printed index of plant-names; and who can doubt that many binary names came into established use, long before Linnæus, in just this accidental way? And yet, the formation of these binomials with the ancients was not accidental, after all. The first word of Dodoens' *Ranunculus aquatilis* had been for ages a settled generic name; and the like had been true in the majority of such cases. The second word was likewise, in most instances, if not in every one, an adjective describing some peculiarity of the species. We might therefore, if it seemed worth while to invite further controversy upon the matter, deny that the formation of old binomials was at all accidental, except in rare instances.

As for Linnæus' having been the first to reduce nomenclature to a system by proposing regularly, the binomial method, it may be we are all the while conceding more than is historically true when we admit it. It is not easy to give up old prejudices. Those of us who were American schoolboys twenty-five or thirty years ago would have been somewhat startled if one had told us that Columbus had not been

the discoverer of our native Western World. There may have been those among our elders who could have instructed us that the Scandinavians had visited our shores some centuries in advance of the great Italian navigator, and that Columbus knew all that before he sailed. To compare events small with great, it is a German who ought to be credited with the proposing of binomial nomenclature; and Linnæus, the Scandinavian, will be justly honored when we concede that he adopted this system from Rivinus, his predecessor. The German appears to have been quite as serious in his proposal of the method, as the Scandinavian was in his adoption of it, for he deemed it worth legislating upon, ordering that only adjective specific names should be employed, in which respect even Moench seems to have paid deference to Rivinus rather than to Linnæus, as the true founder of the system, for he rejects all the Linnean personal and geographical names, substituting adjectives in place of them, in accordance with the requirements of the elder binomialist.

In view of all the circumstances, and there are many more that might be named, we fail to see the least infringement of any principle, in citing pre-Linnæan authors of such binary names as are well known, or may easily be known, to have been in general use long before Linnæus blessed them with his approval. Nor are we alone in this view. A careful reading of the works of several prominent botanists of the last half-century, will reveal a number of such citations.

For any American who may possibly wish to enter the lists as against such usage, we would suggest that he correct, for it may need correcting, this pre-Linnæan binomial which he will find in Gray's Manual and elsewhere: "*Sparganium minimum*, Bauhin," for the name and the author are of the year 1623.

Botanical Literature, Old and New.

III.

A Flora of North America: Containing Abridged Descriptions of all the known Indigenous and Naturalized Plants growing north of Mexico: Arranged according to the Natural System. By John Torrey, M.D., F. L. S., &c. * * and Asa Gray, M.D. * * New York: * * 1838—1843.

Harvard's Botanic Garden and its Botanists. Ernest Ingersoll, in *The Century Magazine*, xxxii, pp. 237—248. (1886).

To critical students of North American phanerogamic botany, the two volumes of Torrey and Gray above named are destined long to remain, what since their publication they have always been, the most indispensable of books. We have once or twice already publicly, but incidentally, adverted to their great value as an aid to the clear identification and exact discrimination of many western genera and species. Even the Synoptical Flora when finished, as we hope it one day may be, will be received by those best versed in American botany, only as an elaborate supplement to the older treatise. Over and above its being carried out to the end of the series of phanerogamic natural orders, it will include all the genera and species which have become known as inhabiting the given territory, since the year 1843. Very likely it may be assumed that, in that new Flora which we are taught to regard as only a new edition of the old Torrey and Gray,

the genera will have been more judiciously limited, and the species better defined. A bias of this sort, magnifying the importance of the new edition, and depreciative of the merits of the old, is, we think, already too well seated in the botanical mind of this country; and the interests of our science, no less than the considerations of justice due to all concerned in the production of the older treatise, require that we combat that prejudice.

A correct view of the whole case will hardly be gained without a retrospective glance at the condition of botanical science in North America in 1838.

Although down to about the year 1830 more than one-half of what is now comprised within United States' territory was, botanically speaking, almost unknown, the regions eastward of the Mississippi had been fairly well explored. Their botany, though not, to any date then recent, brought within the limits of a single treatise more respectable than Eaton's Manual, was nevertheless in such an advanced condition that little more could then be done than judiciously to compile from the elaborate treatises of Walter, Michaux, Pursh, Elliott and Nuttall, and the less pretentious but equally valuable publications of Muhlenberg, Schweinitz, Bigelow, Le Conte, Torrey and many more. It is remarkable that, for a truly brilliant epoch in North American botany, we are obliged to revert to the first quarter of the century which now draws near its close. At no other time had we, in proportion to the whole population of the country, and the facilities for field and closet work—nay, I may almost say unqualifiedly—at no period had we so great a number of learned, able and zealous botanists at work as then. Account for the fact as we may, the botanical history of our latest five and twenty years will not yield us ten names of equal weight with those above enumerated; and this notwithstanding our doubled and redoubled population, unnumbered centers of learning, manifold greater facilities for travel, and our inviting fields unmeasured which are still but half explored.

In 1838, we say, the flora of the East, from Louisiana and

and the Carolinas to Labrador and the Lakes had already been quite well worked up, though the results were stored away in various local floras, or earlier and incomplete general treatises. But hitherto, upon the vegetation of the far and vast north west, embracing what are now the enormous States and Territories of Nebraska, Wyoming, Colorado, Utah and Nevada, Idaho, Montana, and almost all of California, Oregon and Washington, very few pages had been printed, almost nothing was known. But there was just now on hand, and ready for the press, a truly magnificent pile of manuscript upon the botany of these least known and almost untraveled leagues of our domain; descriptions of new genera of plants almost by the score, and of new species amounting to many hundreds, the material of which the author himself had gathered upon an expedition at once the most extensive, toilsome, perilous and successful which has ever been made in the interests of North American botany. I scarcely need say that the explorer of those all but impenetrable wilds, and the author of these priceless written contributions, now in 1838 ready to be given to the world, was Thomas Nuttall.

Upon the seven hundred pages of the first volume of the Torrey and Gray Flora there are published some four hundred and fifty-five new species of plants, an average of about one and one-third to each leaf of the book. It is a very large percentage of novelties for the Flora of a country, so great a part of whose territory had then been under unremitting phytographical investigation for at least a hundred years: and it is this fact that the book contains the original descriptions of almost half a thousand new species, including the usual proportion of new generic types, which gives to this first volume that kind of a value which never can depreciate. After writers upon genera and species always feel that they must, if possible, consult original descriptions. Be these, as one too often finds them, too brief, seemingly incomplete, or faulty in any way, it still remains that no altered, amended or even improved descriptions of subsequent authors can take the place of them in the eye of a critical and accurate phy-

tologist. And, if these first written characters were by an author who knew more about his species than the herbarium specimens could show, then his own descriptive phrases are of the very highest value. About three hundred and forty of the new species in the first volume of the work under consideration were described by Nuttall, who had not received his specimens, dead and dried and tied up in bundles; he had collected them himself, and the greater part of them had been seen in their native localities by no other botanist's eye but his own. Nuttall is the author of more than two-thirds of all the vast aggregate of new species which enrich and render of immortal value this old book. It was his pen that supplied the manuscript, sometimes of entire and successive pages that are filled with descriptions of the novelties he had discovered on his great western tour.[1] I am careful to indicate thus particularly this botanist's large, and even well nigh all-important part in the actual authorship of the Flora, because of certain expressions, made more or less recently, which seem to voice such a misunderstanding as this would be, that Nuttall served the chief compiler of the Flora in the capacity of a mere collector of many novelties described in the book; that he did no more than place his bundled specimens and copious field notes in the hands of his young successor at Harvard College, to be written up and printed by him.

I have certainly read in an editorial of an American serial, this year, that Nuttall did not publish the species which are credited to him in Torrey and Gray. In a still more recent paper, published in an Academy Bulletin, I read a commendation of Nuttall's field notes on a certain genus, in Torrey and Gray; which sounds as if Nuttall were the author of certain notes, but perhaps not of the specific characters: and this in a genus which was, upon the whole, better known by Nuttall, and its species better defined by him (if we, who live

[1] See Torr. & Gray, i. pp. 95–98, 267, 276–278, 326 & 327, 343, 350–353, and so on, to the end of the volume.

in the geographical center of the genus, may speak). than by any author since his day.

The popular, though not botanical writer, Mr. Ernest Ingersoll, ran into no such error about Nuttall's being the author of his own discovered species, although he would have been more excusable, if he had. Speaking of the great naturalist's occupation, in Philadelphia, after his return from the famous western expedition, he says: "He devoted two or three years to the study of his botanical collections and the publication of the results."[1] One-half of those precious results of the two years' perilous travel, and as many of quiet library and herbarium work, he published in the first volume of this Flora of North America. He had himself been the first to receive, from Dr. Torrey, the invitation to share with him the authorship of that work. The place for his name on the title page. thus proffered, he had declined. Being at that moment not only the most noted, but the most experienced North American botanist, the one who had already traveled farther in America, and seen more than all the rest combined, he fully comprehended, what the original projector of the treatise and his eventual younger colleague discovered later, namely, that it was quite too early to attempt a Flora of North America while fully one-half the territory thereof was yet lying an almost untraveled and unknown wilderness of botanical wealth incalculable. When Torrey and Gray. after five or six years of work on the Flora, saw this fact. as Nuttall had foreseen it, they put an end to the publication. It remains unfinished, as all know; nor is its great second edition. the projected Synoptical Flora, much nearer being finished, though half a century has passed.

However, had Nuttall acceded to Dr. Torrey's wish, seating himself to the task of a compiler, he would not have made the celebrated expedition with Wyeth, and the first volume of the old Flora would have fallen short of those choice contents, the three hundred and forty Nuttallian

[1] Century, xxxii, 238.

new species, which now make more than half the value of the book.

The second volume, rich as the first in genera and species known only from the distant West, and through the same intrepid searcher of plains and mountains, is far from possessing the same value as the first, and, for the reason intimated at the outset. It is not the medium of original publication. The familiar quotation marks which, throughout the first volume where they so abound, tell us we are reading the discoverer's own descriptions of his plants, are wanting. Another work is now cited for the benefit of those who may wish to read just what Nuttall wrote. It was a misfortune for this volume that his manuscript of all those hosts of new Compositæ could not be secured for its pages. He had now published them in the Transactions of the American Philosophical Society, in a volume not to be found in, or obtained for, every library where it may be needed; though it will be indispensable to every one who may in the future wish to study critically all or any part of the vast subject of West American Compositæ.

Concerning Nuttall's part in the authorship of the Flora there is more that might be told. The pages of the first volume suggest other matters of interest in this connection, but we pass them. Enough has been said, it may be, to direct attention to the subject of the immense services which this man rendered to our science in this country. There was need of this; because the name and reputation of Nuttall have not been carefully sustained among us in recent years. The man had been by nature so largely endowed as to possess a little individuality among men, an individuality, indeed, too strong to be suppressed by the forces which conventionalism usually brings to bear with success upon even eminent scholars and scientific men. At home, perfectly and happily so, on mountain or in forest, or anywhere amid the haunts of nature, in town or city, the library and laboratory walled him in. He lived a recluse, and, had eccentricities. When the poet's soul, which hardly less than the naturalist's was his, had spoken its

touching and eloquent farewell to America,[1] and he had left our shores, men after a time began occasionally to entertain their juniors, by rehearsing some of Nuttall's eccentricities. Many of us have heard them recounted, by genial men whose happy voices we now no longer hear, the loss of whom we all deplore. But elder men's mirthfulness, albeit not ill-meant, is none the less liable to engender a little prejudice when the subject of it is a person. At the very least, it does not foster veneration.

In the well written *Century* article of two years ago, it is well shown how ornithologists, down to our day, extol the merits and revere the name of this great man. But his services to botany were far more varied and extensive than those which he rendered to any or all the departments of zoological science; and, if he is not just now duly appreciated among botanists, it is because we are a generation who have allowed our botanical vision of Nuttall to become obscured by a sort of prejudice; not very deep, or strong, it may be; nor attributable to any malicious effort that has ever been made to detract from the man's merits. We never heard that he had enemies, or envious rivals. And he who could, in the face of such obstacles as plebeian birth and early poverty without patronage, in four and thirty years, accomplish all which he accomplished, placing his name first on the roll of American scientific men, and all by quiet, unobtrusive, hard and unremitting toil of all sorts, must almost have been, in his inmost self,

"Too great for praise, too high for rivalry."

Certain am I of this: that his whole career is, to this day, simply without a parallel, in the annals of natural science in the United States of America.

I sincerely hope that these remarks may secure from some of our younger men a real attention to Nuttall's important part in the making of the Torrey and Gray Flora. This has been my chief end in writing these paragraphs. And yet, I can not conclude without making more distinct

[1] Preface to N. Am. Sylva.

reference to the real and chief elaborator of the Flora as a whole.

Asa Gray wrought during twice four and thirty years in the still rich and fruitful field of North American botany, and, amid surroundings thrice favorable to large and showy, and even substantial, results. His name had been immortalized had his good labors ended forty years ago; for just that many years have passed since he concluded the second volume of this great work. The task as a whole was, I believe, his. Young, energetic, enthusiastic, and, for a man so very young, judicious, learned and discreet, in a quite masterly way he arranged the materials and gave forth the printed pages, part by part, under the patronage and by the advice and help of Dr. Torrey.

And so these two old volumes, quite apart from their great usefulness—and that, as we have earlier remarked, can never cease—should be regarded as a sacred heritage bequeathed us by the greatest names in our botanical ancestry: a legacy more valuable by far than any we may hope to give to the generations which shall succeed us.

IV.

A Study of North American Geraniaceæ. By William Trelease. *Mem. Bost. Soc. Nat. Hist.* iv. pp. 71—104, with twelve plates. 1888.

Synoptical List of North American Species of Ceanothus. By William Trelease. *Proc. Calif. Acad. Sciences, 2 ser.*, i. pp. 106—118. 1888.

In the Nuttall and Gray account of *Ceanothus*, which appeared in a part of the Flora of North America issued in 1840, twenty species are described. Eleven of these were new, and, mainly of Nuttall's discovery and authorship.

In Watson's Index, of a later date by almost forty years, no more than twenty-five species are enumerated. A goodly number of new ones had been brought to light during that long interval; but the author of the Index made confusion of several which earlier authors had well distinguished; hence the seemingly small increase of species in the thirty-eight years between 1840 and 1878.

The recent Synopsis by Professor Trelease, appearing only a decade later than Dr. Watson's monograph, concedes to the genus in North America, thirty-two species. Five new ones are proposed, and the present writer has been followed in the restoration of two of those of Nuttall which had been suppressed. The paper seems to be a real contribution to the published knowledge of *Ceanothus*; and, that it should have been such, was not at all a matter of course. For what was to be altogether a study of the herbarium and library, a more difficult subject could hardly be chosen than this genus. The individual flower is scarcely mentioned in describing species. It is the same thing in all. By the fruits they may be separated into groups; and the anthotaxy can scarcely be employed to any greater advantage. The species, in a word, are all rested upon vegetative characters, and mode of growth. The last named is the most important point of all; and scarcely a vestige of that can be made out, even inferentially, from the herbarium representations of the species. In order to a very satisfactory discussion of the genus, nothing would seem more needful than a knowledge of the shrubs as they appear in their native wilds, where, up and down the Pacific coast of the continent, for a thousand miles and more, some twenty-five or thirty-five kinds of them make up largely the almost impenetrable brush-wood of the hill and mountain slopes, at all elevations, and for from two hundred to eight hundred miles inland. Our author, although a stranger to the ceanothus hills of California—we hope he may not always remain such—has given us, we say, a truly valuable paper, notwithstanding that we may not be quite able to reduce all the forms we know of, to places and names in the Synopsis.

No generic character is given; there was small need of that; the limits of the genus are not in the least uncertain. It is what one may call a natural genus. But there are differences between the few Atlantic species and the many western forms which might well have been indicated; perhaps they would have been, had the author clearly recognized them. The Atlantic *Ceanothi*, at least *C. Americanus* and *C. oratus*, are deciduous and flower from the new and growing wood. The thirty or more which belong to the West are evergreen, with one exception, *i. e.*, *C. sanguineus;* and nearly all flower from the hardened wood of the preceding year's growth. The error of treating them all as flowering from the new wood, though scarcely affecting the naturalness of Professor Trelease's new grouping of the species, shows how an able botanist may err in his widest generalizations when unfamiliar with the life history of the subjects of his study.

We have only one Californian ceanothus which is closely allied to the eastern *C. Americanus* in that it is semi-herbaceous and flowers from the new wood. That is *C. decumbens*. In *C. papillosus* and some of its near kindred the principal flowering takes place early, and from the old wood, but is often followed by a second display of bloom from the new, or growing branchlets. In many cases, the flower-clusters, even from old wood, are borne on long and leafy stalks which, at flowering time, are quite indistinguishable from true branches; but their real peduncular character is proven in autumn, when they not only shed their bract-like leaves, but die back to their parent branch and ultimately fall away. In the whole Cerastes section, and in other groups as well, the flower-buds are all formed upon the old wood in autumn, and break into bloom on all the younger branches in early spring before the new growth is begun. We are scarcely able to understand how the Cerastes species could have been so misunderstood, in even a closet study of them. But what has befallen the botanical wing of the California Academy, that it may no longer be entrusted with even the editing of a valuable

paper on Californian botany? In Dr. Kellogg's day—and he made no great pretensions—a non-resident botanical contributor would have had his error kindly pointed out, and his correction of the manuscript would have been waited for.

The Memoir upon Geraniaceæ impresses us as the most excellent production of its kind which has appeared in America within recent years. The clear discriminations, the full descriptions, excellent typography, useful illustrations, and elaborate list of references—all these combine to make a monograph which every botanist must prize. The species are not very numerous, but, as Professor Trelease's pages show, in so familiar an old genus as *Geranium* there was much to be done in the way of clearly identifying and satisfactorily describing even our introduced and naturalized species. We feel like commending this Memoir to eastern botanists everywhere, as illustrating the kind of labor still waiting to be done in many a small natural order whose genera and species are equably distributed throughout our wide land, and which have never yet been collectively elaborated with due care and painstaking. We shall hope to see much more of this kind of work from the same pen.

Biological botanists are said to be more or less indifferent to matters of system and of nomenclature; but Professor Trelease, though well known in biological circles, is far from indifferent to the cause of systematic botany, as this and other recent monographs plainly enough declare. To nomenclature we wish he were not so indifferent; but, over against this which we deem a fault, we place the great merit of his freedom from all dogmatism and self-assertion. It is most pleasing to read, now-a-days, the writings of a botanist who, carrying with him always the evidences of learning and ability, yet often admits, tacitly if not openly, that other people may possibly know something, and be in the right where differing with himself. We have not had many such authors. The training of most of us has been in a school of different tone.

V.

Contributions to American Botany.—xv. By Sereno Watson. *Proc. Am. Acad.* xxiii. pp. 249—287. 1888.

The important article in this one of Dr. Watson's annual Contributions is that which, if it meet the approval of the botanical world at large, will banish the familiar name, *Vesicaria*, from the North American flora. In habit and pubescence it is certain that our large assemblage of plants that have been relegated to that genus differ extremely from their prototypes of the Old World. Three years ago the present writer determined upon making such a proposal as that now published in the American Academy Proceedings: but he shortly abandoned the task, partly on account of a deficiency of materials of typical *Vesicaria* from Europe, on his side the continent, and partly in view of the occurrence, in South America, of a peculiar plant, quite intermediate between North American and European *Vesicaria*, the *V. Mendocina* (Philippi, in Linnæa, xxxiii. 12), an important species whose existence Dr. Watson has not alluded to in his discussion of the subject. But we were never of opinion that a new generic name would, in any case, have to be made for our North American plants. Nuttall, although very familiar with all these species, and their near allies, in the far West, did not consider that those in which the pods are inflated beyond the globose, and far out in the direction of the didymous, were generically distinct from their neighbors which are just like them in aspect and everything else save the globose pods. And Nuttall was a close disciple of the elder De Candolle and others of their time, who made genera upon a minimum of characters. For the didymous-podded species he proposed a merely subgeneric place and name. The name was *Physaria;* and Asa Gray, as long ago as 1845 raised it to

generic rank, naming under it two species.[1] This we judge to be the name under which all except one of Dr. Watson's species of *Lesquerella* ought to have been ranged, when they were separated from *Vesicaria.*

The little plant which we have known as *Vesicaria Lescurii* is doubtless a good monotypical genus; at least, this has been our own mind ever since we studied it many years ago, in its native soil near Nashville. The dedication of this unique crucifer to the venerable Professor Lesquereux could have been a worthy compliment to him in his declining years. But to have given him a new name in Latin, calling him Lesquerus, was rather worse than unnecessary. Learned authors had long ago, as they supposed, settled it that Lesquereux in Latin should be Lescurius; but our author evidently failed to perceive this, even while handling the familiar specific genitive *Lescurii* which, of itself, should have been enough to determine *Lescuriella* to be the proper writing of the generic name.

Sketch of the Life of Thure Kumlien, A. M.

In scientific life, as in other spheres of intellectual activity, there is the man who has the tact to make his name, before he dies, a household word throughout the land that gave him birth; and, there is also his fellow, of equal mental acumen and moral force, who lives as long, labors as zealously and learns as much, whom still the unscientific world beyond the circle of the man's friends and neighbors, never hears of. Ordinarily it is the difference between one who looks first to himself, to his own fame and promotion, making his science

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[1] Gray, Gen. Illust. i. 162.

subserve ambitious ends, and one to whom science either in itself, or for the enjoyment which it brings to the inner and intellectual or sentient man, is enough, without the praise of men.

A purer, nobler type of the naturalist of the reserved and quiet non-advertising class, there probably was not, in his day, in America, than THURE LUDWIG THEODORE KUMLIEN. who departed this life at Milwaukee, Wisconsin, on the fifth of August last, in the seventieth year of his age.

Among American botanists of his time it may well be he was not widely known. Other branches of natural history more largely occupied his time; and even in botany, his active correspondence was more with European than American men. Affected with a kind of diffidence not so very uncommon, at least in Europe, with men of finest mould, of great intelligence and of deep and thorough scholarship, he was extremely averse to figuring in public—even before the small scientific public—by writing and printing his own most valuable observations. It was owing to this reticence that no botanists in our country knew him well, except such as had been, fortuitously or providentially, brought within the happy circle of his personal acquaintance. But still there will be more than one botanist among us, with whom the name and memory of Thure Kumlien will forever be held in deep and loving veneration.

The following I transcribe from a beautiful necrologue lately published by Mr. W. M. Wheeler, in the form of a supplement to the Annual Report of the board of trustees of the Milwaukee Public Museum, an institution which my early instructor and life-long friend had, at the time of his death, been serving for some years in the office of Conservator:

"Thure Kumlien was born in Herrlunda parish, Westergothland, Sweden, on the ninth of November, 1819. His father was an army quartermaster and owned and operated several large estates. Thure, the oldest of fourteen children. was early entrusted to a private tutor, soon entered the gym-

nasium at Skara and subsequently graduated from the University of Upsala, in 1843."

It was evident, not only from the friendly correspondence which was always kept up between them, but also from many a pleasing anecdote which we were wont to hear of life and study and travel in intimate companionship with his revered master, that Mr. Kumlien had been, while at Upsala, a very special favorite among the botanical pupils of Professor Elias Fries. How thoroughly worthy the youth must have been, of the particular attention of the great Swedish botanist of the nineteenth century, was still manifest in Mr. Kumlien when I first made his acquaintance, some sixteen or eighteen years after his arrival in this country. He was then a sort of second and American edition of Fries, in his almost equal familiarity with each of the following great departments of botanical study; phanerogams, ferns and their allies, mosses, lichens and fungi. He had, in 1860, and I know not how long before, so well mastered the extensive and varied flora of southern Wisconsin, that there was no indigenous tree or shrub, flower, grass or sedge, or moss or hepatic, lichen or mushroom, the scientific name of which was not at his tongue's end for you at any moment. I am confident that, notwithstanding our considerable list of worthy names in American botany, no state in our Union has ever had so complete a master of its whole flora, as Wisconsin had in this extraordinary man, whom our eastern botanists seldom heard anything of; whom, with his low stature, muscular frame, rather stooping shoulders, light hair and keen blue eyes, a stranger might have mistaken as he passed along the country roads, for an ordinary farmer from the Scandinavian settlement; who, in the most polished society would have been recognized as an intelligent, refined and almost courtly gentleman; in whom any scholar would have found a finished collegian of the old Swedish school whose pen could indite Ciceronian Latin and whose tongue could address a foreigner in, I believe, any one of the languages of Europe spoken between Spain and Sweden. But that which makes his

thorough familiarity with so many branches of botany seem more remarkable, more unmistakably indicative of uncommon natural gifts, is that fact that, even from boyhood, his specialty appears to have been ornithology. It was to the birds, yet not so as to exclude other branches of zoological study with which he was also very familiar, that he gave most of his time. On his vacation tours in college days, he had penetrated to some remoter parts of the Scandinavian peninsula, and had visited the islands in the Baltic; and, although he gave us charming word pictures of the flora of those more secluded places, it was plain that what had pleased him most had been the new gains thus made in the knowledge of his particular favorites, the birds. Even the fame, which he would not seek, but which was thrust upon him at last, in no small measure, was that of an ornithologist. It was with reference to its probable facilities for ornithological work that, under the guidance of a map only, and from afar, he made choice of the locality in Wisconsin where he would build his cottage and consecrate his home.

It was on the twentieth of August and, if I mistake not, in the year 1843, that Mr. Kumlien, then but twenty-four years of age, reached the shores of America,[1] accompanied by his young wife; their faces set for the Wisconsin frontier. The part of the country which had been determined upon, as I have said, from a map-study of the whole region while they were yet more than a thousand miles away from it, was the vicinity of Lake Koshkonong, in Jefferson County. The spot when reached must fully have answered every expectation of the young naturalist. The lake, some eight or nine miles long and three in breadth, as I remember it, is but an expansion of Rock River, its sinuous shore line touching the bases of a hundred low hills covered with oaks or overrun with hazel, with many a fair interval of open grassy slope, or widespread lowland meadows. The larger estuaries, sheltered by

[1] Mr. Wheeler has given 1844 as the year of arrival; but I have excellent reason for thinking that he came a year earlier than that.

neighboring groves, their still and shallow waters bordered with green fields of reed and wild rice, were twice in each year the resort of great flocks of wild geese, pelicans and swans, and indeed of all the tribes of water fowl and wading birds, not excepting many that are usually maritime only. And the wooded hills and open meadow lands were equally the home of the whole concourse of spring and summer song-birds, of grouse and pheasant and other larger wild fowl. While the region remained almost unsettled, and while wild birds so abounded, an ornithologist might have been pardoned had he forgotten more or less of his botany. But this one did not. So ardent a lover as he was of all things beautiful in nature, could not but have been enraptured with the floral splendors of wild woodland and unbroken prairie as they must have appeared to his eye in that early day. Even as late as 1858, when I first saw that land, after multiplied settlements had sprung up everywhere, and the prairies had been converted into fields of waving grain, and the open woods turned over to the destructive teeth and hoofs of the domestic flocks and herds, there still remained in many a protected spot charming traces of the primeval floral wealth, in pink and azure banks of phlox and polemonium, violets, dentarias and diclytras, lupines, wild peas and vetches; extensive yellow beds of caltha and ranunculus; meadow patches of scarlet and yellow castilleias; fence corners filled with grassy-leaved hypoxis, tradescantia, camassia and zygadenus; hazel borders all undergrown with erythroniums, trilliums, orchis and nodding wood anemone; thickets of wild rose and shad bush, wild plums and cherries; groves of white-barked aspen and fragrant rosy-blooming crab apple.

The building site which Mr. Kumlien chose at the first, and whereon he dwelt to the end of his life, was, for the work and the pleasure of a poet naturalist—and such was he—admirably selected; lying back from Lake Koshkonong, to the northward. upon a pleasant elevation, forth from which one looked down across a mile or more of moist meadow, to the shores of the lake. A considerable extent of oak woods

enclosed the place northward and westward; to the eastward lay a stretch of open undulating arable land, suitable for farming purposes. The pristine quiet and seclusion of the place was always retained; for, when other settlers had taken possession of all the country round about, and regular public roads had been laid out, the naturalist's home was left about equally distant from every public highway; so that one reached the place by either of two by-roads, closed by gates, and leading circuitously about among the woods.

Lake Koshkonong proved not to be the only naturalists' paradise in that immediate region. Some two miles to the eastward lay, deep down among the wooded hills, a chain of three lesser lakes. Along the bluffs above these lakes there flowered in earliest spring, almost as soon as the ice had melted, such rarities as *Anemone patens*, *Ranunculus rhomboideus*, *Draba Caroliniana* and *Arabis lyrata*, plants not then to have been found in Wisconsin except on the bleak summits of such hills; and they are probably all now extinct even there. In the reedy margins of the smaller lakes there grew, in summer time, such interesting aquatics as *Pontederia cordata* and *Brasenia*, and also every kind of water lily indigenous to the northern states; *Castalia tuberosa* and *Nelumbo lutea* both in rich abundance.

Another point, altogether unique in botanical interest, for that part of the country, was a little tract of tamarack marsh which occupied a deep abrupt depression amid the heavier forest some two miles distant northward from the dwelling. Singularly isolated from its kindred tracts so frequent and extensive in more northerly portions of the State, this little swamp of not more than ten acres contributed immensely to the diversity of the flora of the region as a whole. The prairies, and the timbered uplands which bound them, have no coniferous trees or shrubs, no ericaceous plants, almost no orchids. In the marsh, a single species of deciduous conifer, *Larix Americana*, was the only tree, but formed almost everywhere a forest well nigh impenetrable; the older branches draped with lichens such as one did not meet with in other

woods; the ground beneath, a deep mat of other lichens and of mosses, different from all that grew in the drier forests of the surrounding hill-country. Just here and nowhere else occurred several sorts of *Vaccinium*, *Cassandra calyculata*, two or three species of *Pyrola*, the winter-green of both kinds, *i. e.*, *Gaultheria* and *Chiogenes*, wild cranberries, and still other ericaceous shrubs and undershrubs, such as would delight the heart of any botanist whose early home had been in northern Europe. Of orchids there were many, most of them peculiar to America, and new to the eyes of our botanist when he first saw them in this place; such were the magnificent *Cypripedium spectabile*, the more graceful *Calopogon pulchellus*, several different kinds of fringed orchis, *Pogonia ophioglossoides* and *Arethusa bulbosa*. This last was always in Mr. Kumlien's opinion the very loveliest of all North American wild flowers; for he delighted especially in such as combined exquisite form and coloring, with rich fragrance. It was also in this little bit of a botanical northman's paradise that he once discovered a bed of what would necessarily be dearest of all forest undershrubs to the heart of a Swedish botanist, *Linnæa borealis*. This discovery had been made at an early day, and he could never find the precise locality a second time. Any one who has ever attempted to return from the midst of a tamarack swamp to the point at which he entered it, or even to keep the points of the compass while within its labyrinths, knows what this means. Many years later the present writer had the satisfaction of carrying to his friend a sprig of Linnæa from what must have been the original and long lost spot; but he also failed in every subsequent search for it.

During the first twenty years of his residence in America, Mr. Kumlien was engaged in forming collections in all branches of natural history, for such celebrated institutions as the Stockholm, Leyden and British Museums in Europe, and the Smithsonian in this country; and also for many private individuals on both sides of the Atlantic. Mr. Wheeler says:

"He was in constant communication with Dr. T. M. Brewer of Boston, from 1844 until Brewer's death in 1879, and was one of the largest contributors to the History of North American Birds, published by Brewer, Baird and Ridgway. Other correspondents were Professors E. Fries, Sundeval, Nielson and von Eylen of Sweden; Steenstrup, Sars and Loven of Norway; Prof. Peters of Berlin, Count Turati of Milan, Prof. H. Schlegel of Leyden, and Professors J. E. Gray, Alfred Newton and H. E. Dresser of England."

In 1867 he received an appointment as Instructor in Botany and Zoology in Albion Academy, a collegiate institution which had sprung up within a short distance of his home. This place he filled most acceptably for some years. Later he was employed by the State of Wisconsin in forming and arranging collections for the State Normal Schools and University. From 1883 to the time of his death he held the place of Conservator to the Milwaukee Public Museum; a position which he was about to resign simply in order that he might retire and pass a peaceful old age at his quiet and secluded home near Lake Koshkonong. The dear companion of all his early and long years of frontier life, had passed to her rest some twelve or fifteen years before. His four children, three of them sons and all adult, were spared to him until early in the present year, when Frithiof, the youngest, died, and the father's bereavement was most distressing. But there was no indication that his own end was approaching. A young man, indeed, for one who had so nearly filled out his threescore years and ten; neither mind nor body yet showing the infirmities of age. He was making ready for a return to the birthplace of his children, and now of his grandchildren, to be with them thenceforward. His own death came speedily, from accidental poisoning; and that after long years of experience with the deadly chemicals of the botanical and zoological laboratory.

For an estimate of the general character of my friend, I shall again avail myself of the language of Mr. Wheeler, who was his colleague in later years:

"Mr. Kumlien was no narrow man. He was passionately fond of painting, music and poetry. I have heard him repeat with a glow of delight verses from Runeberg and from the Vikingerbalk of Tegner's Frithiof's Saga, rendering the wonderful rhythm of the latter with exquisite grace and precision. He was a man of most refined tastes, without any of the extravagant desires which such tastes often engender. He was satisfied to live most simply a life which philosophers might envy.

"Higher than his intellectual accomplishments rose his moral qualities. The leading features of his character were harmlessness and truthfulness. It was as if the words *Innocue virito, numen adest,* which he read in his youth on the door of the great Linné's study, had so thrilled him that every thought and every action vibrated with them to the moment of his death. No one was ever farther from slandering or speaking ill of his fellow-man, no one more fearful of paining any sentient thing. His love of truth was shown in the scrupulous accuracy of his observation, in his slow decisions on difficult matters and in his careful interpretation of the remarks of others. Truth was as sacred to him as to any of the glorious early naturalists, whose enthusiasm he inherited. That his innocence and love of truth were fixed and immutable features of his character is shown by his retaining them under the most adverse conditions of life. Nothing could tempt him to seek wealth for wealth's sake, nor to seek favors by even the smallest and most commonly practiced deceptions.

"None who met Mr. Kumlien ever forgot his kind address, the lack of all affectation and the modesty and ease of his conversation. He was very fond of the young and always ready to put at their disposal his long experience as a practical ornithologist and botanist. Such qualities are not to be underestimated in a naturalist, for they are the means of charming the young and making good naturalists of youths who would be repelled by a cold exterior. Many of our rising botanists and zoologists owe much to Mr. Kumlien's warm

and sympathetic enthusiasm, which was as contagious as hearty mirth.

"Most admirable was Mr. Kumlien's ability to endure the severest blows of fortune, without losing his composure of mind. Misfortunes which would have prostrated other men, left him only a little sadder, but no less determined and composed. The death and illness of beloved friends and relatives were very keenly felt by one so sensitive, but they fell on his thoughts like the gloom of night on quiet waters, causing no ripple, only obscuring their crystal brightness till the coming of the day."

Mr. Kumlien was the recipient of honorary degrees from several institutions of learning, and was corresponding member of a number of learned societies in Europe and America.

The only botanical paper which I know of his having published, appeared not many years since, in the Proceedings of the Wisconsin Academy. The subject was that of the gradual disappearance of species from the Wisconsin flora; a record of what he had witnessed in this direction, during the many years of his residence; a theme which the sympathetic, or poetic, side of his character may have moved him to take up. The changes wrought upon the face of nature, more especially such as lessen the diversity of forms, by the extinction of one's favorites of the grove or hill-side, are always painful to a soul refined as his was. And this reminds me that the latest letter I received from him, was tinged with melancholy as he related how our long cherished tamarack swamp, near his home, had been bereft of its trees, its ericaceous undershrubs, and its delightful orchids; and, that human beings of the common sort, had drained it and ploughed it and planted it with market-garden vegetables.

Among the purple autumnal Asters, as they grew around him there, at least in the earlier time, there was one species which received from Professor Fries, the name *Aster Kumlieni*.

A rare and still but little known Ranunculaceous plant of the middle Sierra Nevada in California; a flower with the

calyx of a *Caltha*, corolla of *Helleborus*, and an utricular carpel not like that of any genus of its family, a clear generic type, was dedicated to him two or three years since as KUMLIENIA;[1] but these small tokens, like our worded tributes, are all inadequate to speak the praises, or worthily perpetuate the memory of a man so pure, so simple, so noble and so well beloved.

A NEW BRICKELLIA.

BY ELMER C. DREW.

BRICKELLIA KNAPPIANA. Shrubby and low (perhaps a foot high), the slender stems with a smooth white bark: branchlets and floral leaves hispidulous-scabrous, somewhat glutinous: leaves an inch long, lanceolate, remotely and coarsely toothed, or subentire: heads numerous, crowded upon the panicled branchlets, four lines long; bracts of the involucre multiserial, erect, obtuse, conspicuously 3-nerved: flowers about 5: achenes sparsely appressed-setulose.

Communicated by Mr. M. A. Knapp, who collected it in the neighborhood of the Mohave River, California, in the autumn of the current year. The specimens are fragmentary, and the species is closely allied to *B. multiflora*; differing from it in having a rough pubescence, fewer heads and notched leaves.

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[1] Bulletin Calif. Acad. i. 336.

The Vegetation of the San Benito Islands.

The Christian feeling of early Spanish voyagers dedicated to Saint Benedict a group of small islands which lie to the seaward some twenty geographical miles from the northern end of Cedros, the principal island of the Lower Californian coast. The group is some four miles in extent and consists of three islets, of which the westernmost is much the largest, being a mile and a quarter long by three quarters of a mile wide. It is nearly rectangular, rather low on all sides, but with a mound-like elevation in the middle, the summit of which has an altitude of six hundred and fifty feet above the tide.

Up to the beginning of the present year, in so far as I am informed, only two species of plants were known from the San Benitos. These were *Lavatera venosa* and *Hemizonia Streetsii;* and both of them are still, for aught we know, endemic there. For the knowledge of twenty-two other species now to be credited to this interesting little archipelago, we are indebted to the zeal of my friend Lieutenant Charles F. Pond, of the U. S. Ship *Ranger*, at present engaged upon a survey of the Lower Californian shores and islands; he having supplied me with specimens of all the plants herein named, together with much written information regarding the place, and an admirable photograph of one of the island slopes exhibiting a thicket of *Lavatera venosa* and other plants which can be identified from the picture.

Lieutenant Pond judges the San Benitos to be of much older formation than the large island of Cedros near by. The surface is not sharply rocky; the slopes are not abrupt; there is a good depth of soil almost everywhere, and vegetation is abundant, the whole group presenting, on the near

Issued March 20, 1889.

approach, a picture of freshness and verdure at the showery season of the year, the months from December to February, during which the several visits were made. At this time sweet flowing water was found in most of the cañons and ravines; a condition not likely to hold during the summer season.

The collection of plants is from the principal islet commonly called West San Benito, and was made at intervals during the period above indicated. The easternmost island was once visited, but no plants were observed other than had been found on the chief member of the group. The middle island is described as low, and it remains unvisited. I should expect its vegetation to differ somewhat from that of the elevated ones.

Out of the twenty-four species obtained, three are clearly new; and this raises the number of endemic ones to five. The other nineteen, collectively regarded, will interest all students of plant distribution, as indicating a closer relation of the San Benito flora to that of Guadalupe Island, a hundred and fifty miles to the seaward, than to that of Cedros which lies barely twenty miles distant and near the continent. To cite one or two particulars only: Cedros may be said to abound in polygonaceous plants, while Guadalupe, as was early remarked by Mr. Watson, the first writer upon its flora, is entirely destitute of them; and so are the Benitos. The large genus *Astragalus* also, well represented upon Cedros, fails to appear upon either Guadalupe or the Benitos. *Brodiæa*, *Eschscholtzia* and *Lavatera*, altogether absent from Cedros, are plentiful on both Guadalupe and San Benito.

On the other hand, the most characteristic composite of Cedros, *Viguiera lanata*, occurs on the West San Benito; and another allied plant, *Encelia conspersa*, is common to both: but the absence of all the other peculiar plants of Cedros from this closely neighboring spot is adding one more to the many curiosities of our insular botany.

A List of San Benito Plants.

1. Eschscholtzia ramosa, Greene, Bull. Torr. Club, xiii. 217; Bull. Calif. Acad. ii. 389. This is the fourth locality, all of them insular, for this uncommonly well marked species.

2. Lepidium lasiocarpum, Nutt., Torr. & Gray, Fl. i. 115.

3. Lavatera venosa, Watson, Proc. Am. Acad. xii. 249. Said to grow on all parts of the island, but most abundantly in the cañons, where it forms dense and nearly impassable thickets.

4. Frankenia Palmeri, Watson, op. cit. xi. 124.

5. Hosackia maritima, Nutt., Torr. & Gray, Fl. i. 326.

6. Calandrinia maritima, Nutt., loc. cit. 197.

7. Euphorbia benedicta. Shrubby, 6—18 inches high. the main stem an inch or two thick, very short, parting into few stout knotted ascending branches, the whole covered with a close smooth shining bark: leaves fascicled at the ends of the short branches, an inch or two long, including the slender petiole, broadly obcordate, or only emarginate, an inch in breadth, light green and appearing glabrous (very sparingly puberulent under a lens): flowers solitary or few in the leaf-axils, on slender peduncles $\frac{1}{2}$ inch long; glands transversely elliptical, green; appendages broadly obovate-petaloid, irregularly toothed at the nearly truncate apex, $1\frac{1}{2}$ lines long, cream color: capsules large, smooth and glabrous.

Abundant on all the island slopes, and, although nearly related to *E. misera*, decidedly ornamental as well as odd-

looking. The thick shining stem and branches recall those of the Elephant Tree of Cedros, are scarcely of a woody texture, but very soft and spongy when cut, abounding in milky juice. The root of the plant is fusiform, soft and farinaceous; even the thick cortical and milky part being without any unpleasant taste; the body of it tender, palatable and without lactiferous tissue.

8. Atriplex dilatata. Annual, stoutish, erect or decumbent, 2—3 feet high: stem and branches almost glabrous, foliage and bracts mealy; leaves of thinnish texture, cuneate-obovate, acute, entire, an inch or two long, tapering to a short petiole: inflorescence glomerate in all the axils, continued to the ends of the branchlets in interrupted bracted spikes: fruit flattened, dilated, 3 lines broad, little more than half as long, winged at the sides and across the broad truncate summit, the wing cleft into several acute segments.

A new species, most related to *A. argentea* and *A. expansa*, judging from the habit; but the fruits are flat and their sides not appendaged or muricate.

9. Suæda Moquini (Torr.) — *Chenopodina Moquini*, Torr. Pac. R. Rep. vii. 18: *Suæda Torreyana*, Wats., Proc. Am. Acad. ix. 88.

10. Cotyledon lanceolata (Nutt.) Brew. & Wats., Bot. Calif. i. 211 (?). Leaves, bracts and segments of the calyx all narrower than usual; possibly a distinct species. A good specimen now growing in the garden of the University may ultimately remove doubts.

11. Mesembrianthemum crystallinum, Linn. Sp. Pl. 480. Unquestionably indigenous here, as on other of our coast islands. Lieut. Pond's specimens, collected in December, appear to be only a few weeks old, and exhibit only two or three pairs of leaves; but the species is unmistakable.

12. Mamillaria Goodridgii, Scheer, in Salm. Cact. 1849, 91.

13. Encelia conspersa, Benth., Bot. Sulph. 26; *E. Californica*, Gray, in part, not of Nutt. A plant of more shrubby nature than *E. Californica*, with more numerous and more slender peduncles, narrower bracts and broader rays, the marginal villosity of the achene much longer, the face also being villous up and down its whole length.

14. Viguiera lanata (Kell.) Gray, Proc. Am. Acad. xvii. 218; *Baliopsis*, Kell., Proc. Calif. Acad. ii. 35. A second locality for an interesting species hitherto known only from Cedros, where it is abundant.

15. Hemizonia Streetsii, Gray, Proc. Am. Acad. xii. 162. The specimens, obtained late in December, barely beginning to flower.

16. Amblyopappus pusillus, Hook. & Arn., Journ. Bot. iii. 321. A South American plant, frequent along the shores of Southern California, where it was formerly believed to have been introduced from Chili. Its abundance on all our coast islands, even those entirely uninhabited, proves it indigenous with us.

17. Perityle Fitchii, Torr. Pac. R. Rep. iv. 100.

18. Trixis angustifolia. DC. Prodr. vii. 69.

19. Lycium Californicum, Nutt., Gray, Bot. Calif. i. 542.

20. Cryptanthe maritima, Greene, Pittonia, i. 117.

21. Cryptanthe patula. Annual, rather slender, 3–6 inches high, parted below the middle into several widely spreading and loosely spicate branches: leaves linear, an inch or two long, strigose-hispid: two or three of the lower

calyces of the lax inflorescence leafy-bracted: calyx whitish with a dense setose pubescence, its segments lanceolate, with lax herbaceous tips: corolla rather large: nutlet $\frac{3}{4}$ line long, ovate-lanceolate, tubercular-muricate, the ventral groove forked at base and closed throughout.

Of the group of species to which *C. muriculata* belongs, and exceedingly well marked in habit, resembling a *Plagiobothrys* in its loose inflorescence and few wide-spread branches.

22. Plantago Patagonica, Jacq. Ic. Rar. t. 306.

23. Mirabilis Californica, Gray, Bot. Mex. Bound. 173.

An uncinate-scabrous form, with leaves triangular-cordate and abruptly acuminate; the nutlet rather obovate than "ovate." The Cedros Island plant is just like this.

24. Brodiæa capitata, Benth. Pl. Hartev. 339. Said to grow in great abundance on all parts of the island except near the beach, flowering from December to February; the flowers larger and paler, the spathaceous bracts also less deeply colored, otherwise quite like the common and widely dispersed mainland plant. The locality is a surprising one for this species, where we should rather have expected the late-flowering *B. insularis* instead of it; for that is common on Guadalupe, in the same latitude, flowering in April and May.

A Supplementary List of Cedros Island Plants.

To the same gentleman, Lieutenant Pond, who furnished the material of the preceding paper, we are under further obligations. During the winter he has been twice upon Cedros; once at the eastern side, going over ground explored

somewhat superficially by the present writer in the spring of 1885; again at what he calls the "southwest end," a part of the island which has until now remained unknown. Besides furnishing us with fresh and excellent specimens of a few of the earlier known rarities of the island, his various packets have contained material for the following identifications and diagnoses, which may most conveniently be put forth in the form of a supplement to the list which ends with page 208 preceding.

83. CHENOPODIUM MURALE, Linn., Sp. Pl. 219.

84. ERIOGONUM TAXIFOLIUM. Shrubby and apparently diffuse, but low, the slender branches tomentose-canescent: leaves numerous, fascicled, narrowly lanceolate, the margins closely revolute, only 3 to 5 lines long, glabrate: involucres a line long, few-flowered, arranged in loose virgate somewhat arcuate terminal sessile spikes two to five inches long: flowers white, a line long; perianth-lobes similar, spatulate-oblong, obtuse.

From a cañon on the eastern side, four miles below the northern end; collected in flower in January. A species with the vegetative characters of *E. fasciculatum*, but the inflorescence virgate.

85. ERIOGONUM PONDII. Shrubby, stout and low (only 3–6 inches high), intricately branched, the young branches and the foliage white-tomentose: leaves obcordate- or obovate-spatulate, $\frac{1}{2}$—$\frac{3}{4}$ inch long: involucres 2 lines long, arranged in short-peduncled terminal cymose corymbs: flowers white or rose-tinted, a line or more in length: outer perianth segments round-obovate, the inner oblong, all retuse or emarginate.

Common at the southwestern side of the island; flowering in February. A very well marked and rather handsome species, I gladly dedicate it to the discoverer; and with it the following new cactus.

86. Mamillaria Pondii. From a few inches to a foot high, simple or with a few oval or cylindrically elongated branches; growing parts tomentose: radial spines 20—30, white, slender; central 4 or 5, the longest more than an inch in length, rigid and strongly hooked, dark brown above the middle: flowers nearly two inches long, bright scarlet.

Near *M. Goodridgii*, and differing from it in its large size and brilliantly colored large flowers. The fruit is unknown. The plants were in flower in February. The species comes from the southwestern part of the island.

87. Encelia conspersa, Benth., Bot. Sulph. 26. At the southwest end.

88. Nemophila aurita, Lindl., Bot. Reg. t. 1601.

89. Heliotropium Curassavicum, Linn., Sp. Pl. 130.

90. Lycium Cedrosense. Low, stoutish, very much branched, rigidly spinescent, the young branchlets and the foliage minutely glandular-pubescent: leaves fleshy, cuneate-oblong to round-obovate, 3—8 lines long, short-petioled: flowers solitary, on slender pedicels two lines long or more: fruiting calyx obpyramidal, a sharp angle running from base of tube to the apex of each of the 5 broad-triangular teeth: corolla 4 or 5 lines long, narrowly funnelform, with 5 rounded and spreading lobes: stamens little exserted: berry small, bright red.

Southwest side of the island; with both flowers and ripe fruit in February.

91. Physalis pedunculata. Annual, erect-spreading, the flexuous and angular branches a foot long: herbage viscid-glandular-pubescent: leaves ovate or rhombic, acute, entire or with few teeth, an inch long, on slender petioles of equal length: corolla greenish yellow, $\frac{1}{2}$ inch broad: anthers linear-oblong, yellow: fruiting calyx $\frac{1}{2}$ inch long, with sharp angles

retrorsely hispid, pendulous upon an almost filiform pedicel an inch and a half long.

With the preceding; flowering and fruiting in February. The calyx in this species is much like that of *P. muriculata* (Greene, Bull. Calif. Acad. i. 209), but that is a low perennial.

Concerning Some Californian Umbelliferæ.

SANICULA.

Everywhere described as a genus of perennials, the most common Californian species, *S. Menziesii*, might better be called annual than perennial. It belongs to neither class. Although seedling plants may require two or three or five years to bring them to their flowering, no plant ever flowers more than once. No mullein or other biennial is more surely dead, root and branch, when once it has matured its seeds, than is this annoyingly prevalent Californian umbellifer. It is propagated only by seed. No root is ever found to produce more than a single stem, and having produced that one, its life-career is run. Such plants are essentially annual. There is no fundamental difference between annuals and biennials; nor any between biennials and the century plant, for example. They fructify but once, then die. Perennials survive year after year, sending up annually a new product of stem, leaves, flowers and fruit. Such are some of our western Saniculas; but such are not others; and the generic description ought to be modified in favor of the species or group of species whose very different nature as to root-duration is here indicated.

S. MARITIMA is written of as if it were some common sea-coast plant of the San Francisco region. In so far as known it can not well be called maritime at all; and it appears to be the rarest and most local plant of a region where the rare

Issued March 25, 1889.

and almost local species are quite numerous. The original locality, and the only one known to Californian botanists, was a certain bit of meadow land between Alameda and Fruit Vale, toward the bases of the Oakland Hills. An arm of the San Lorenzo Bay runs up in the direction of the place, and that particular acre of ground where it grew is only a few rods distant from the edge of a somewhat brackish marsh. Dr. William P. Gibbons, of Alameda, I think was the discoverer of this plant. He showed it to Dr. Kellogg, and since Dr. Kellogg's death he has indicated to me the spot. The meadow has now been broken up and converted into a grain field. A few small specimens of the plant were found a year ago along the fence. If that is the only locality, the plant is now nearly or quite extinct. It used to be associated there with another perennial the foliage of which is so like its own that, in the early stages of annual growth the two were not easily distinguished. This associate species is *Ranunculus Bloomeri*, a plant by no means rare. I mention it because of the possibility that our Sanicula may yet be found elsewhere associated with and half concealed by the Ranunculus.

After Dr. Kellogg Mr. G. R. Vasey is credited with having collected the plant. Whether the latter obtained it elsewhere, or whether he had his specimens from the original spot, by Dr. Kellogg's help, I know not. Can he tell us?

SCANDIX.

I believe there is no published record of the occurrence of any species of this genus in America; but *S. pecten veneris* (Dod. Pempt. 689; Linn. Sp. Pl. 256) is naturalized in California. Excellent specimens, obtained in Napa Valley by Mr. C. F. Sonne, who thought it some indigenous plant, are in the herbarium of the University. It is a pretty weed, and

one which, with its long-beaked fruits in small umbels, might almost be passed off at first glance, as a geranium of some sort.

CICUTA.

In the few families of plants which are, like the Umbelliferæ, preeminently natural, the anthological and carpological characters, whether of genera or of species, are apt to be very slight. But here Nature comes usually to the rescue of the despairing carpological systematist, and gives him good characters for his genera, or for his species, in the vegetative organs. Only by regarding these latter can a man set good limits to species in such a genus as *Cicuta*.

Linnæus, although failing to give the real characters by which his *C. virosa* and *C. maculata* could easily be distinguished, nevertheless held them totally distinct. Other famous botanists before his day and since have known and indicated the essential differences between the two. There are certain unmistakable and, I suppose, unquestioned differences in the roots of the plants. I cannot better indicate them than by quoting our worthily renowned Asa Gray as he wrote fifty years ago:

"C. VIROSA (Linn.): trunk of the root and lower part of the stem hollow and divided by transverse partitions."

"C. MACULATA (Linn.): root with thick oblong fleshy fibres."

Concerning at least the American plant of northern latitudes which goes for, and doubtless is true *C. virosa*, he might have added that the rhizomatous lower part of the stem is of horizontal growth and scarcely subterranean or subaqueous; a great green tuber-like organ, two inches thick, sending out long coarse fibrous roots mainly from beneath.

The corresponding characters, besides others more remarkable, if his own

C. CALIFORNICA, were all unknown to him, and are still

unpublished. The stems of this species spring each from a small (1 or 2 inches long, ¾ inch thick) deep-seated erect and solid rhizome. Instead of being "stout," they are rather slender below, and, for two or three feet of their length, not only prostrate but rooting at each leafy joint; becoming stouter where they rise from the ground to support their two or three umbelliferous joints. With this very peculiar mode of growth the plant forms beds a foot or two deep in open marshy ground, green at all seasons of the year, flowering and fruiting from April until November.

I have no doubt this is the *Helosciadium* (?) *Californicum* of Hooker & Arnott, so long wrapped in mystery. Their description applies well to our plant; is, indeed, the best description of it extant.

ATÆNIA.

Atænia, Hook. & Arn., Bot. Beech. 349 (1839): *Edosmia*, Nutt., Torr. & Gray, Fl. i. 612 (1840): *Carum* § *Edosmia*, Benth. & Hook. f. Gen. i. 891; Baillon, Hist. vii. 120.

Very distinguished are the authorities who have deemed it well to place under *Carum* the Pacific American perennials here to be remarked upon. But, to neither Bentham nor Baillon was more than one of the species known; even that one very imperfectly. Mr. Bentham could not determine whether its subterranean axis was a root or a rhizome, so meager was his material.

Within the last ten years much has been learned concerning the habit and other characteristics of these plants; but no one appears to have recorded, what is perhaps their most striking peculiarity, their autumnal flowering.

The Umbelliferæ as a family are northern plants and vernal—many of them very early-vernal. In California, where the genera and species are numerous indeed, most of them flower and perfect their fruit between the months of January and May. The species of *Cicuta* are, here as elsewhere,

æstival. But *Atænia* is entirely exceptional in that its flowering period begins with the latter part of summer and continues throughout all the autumnal months.

In the typical species, which is of high altitudes, or of a more northern latitude, this fact does not become conspicuous; but in the species which has gone out as *Carum Kelloggii*, I have long noted what is strange behavior for a plant of this order; a mode of development and a time of fructifying which together indicate that the genus may have had a singular history—a genesis most probably wholly apart from that of the Old World genus *Carum*.

There are some families of the plant-kingdom with species whose habit it is to make their leaf-growth at one time of the year—be it spring or be it autumn, and to produce their flower-stalks, flowers and fruits a half-year later. I am not aware that any Umbelliferæ do exactly so; but *Atænia Kelloggii* comes near to it; for, although like all its kindred plants of the Californian flora, it starts into vigorous growth as soon as the first December rains have fallen, its rank dense tufts of very beautiful foliage contributing largely to the winter verdure of all the rich grassy plains of our coast region, this foliage dies with the coming in of the summer drought in May or June, and the nearly naked flower-stalks put forth their earliest umbels as late as the end of July or the beginning of August; and good fruiting specimens are not to be had before the end of September. Even October is a better month in which to secure ripe fruit and fresh flowers together upon the same stalk. One reason why "This species is very scarce in herbaria"[1] is that it comes into bloom only after the whole season of botanizing is supposed to be ended, in this region, and no one goes into the sere and dusty fields to learn if aught be there.

Be it understood, the plants do not cease growing during the dry season. The leaves die only gradually as the stems slowly develope. The species has not two periods of growth

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1. Coulter & Rose, Revis. Umb. p. 129.

in the year; but the one period extends through full ten months, so that the flowers are autumnal while the foliage is early-vernal.

This particular species is geographically and doubtless genetically, though not historically, the type of its genus: and the genus I can not but hold as valid notwithstanding that, in flower and fruit, it is much like *Carum*.

Of the two generic names that have been proposed one is not allowed a choice. *Atenia* has undoubtedly priority over Nuttall's better name, *Edosmia*. Only the following species have thus far obtained recognition.

1. A. Gairdneri, Hook. & Arn., Bot. Beechey, 349;
   Edosmia Gairdneri, Nutt., Torr. & Gray, Fl. i. 612;
   Carum Gairdneri, Brew. & Wats., Bot. Calif. i. 259;
   Coulter & Rose, Revis. Umb. 128.

2. A. Kelloggii (Gray) = *Carum Kelloggii*, Gray, Proc. Am. Acad. vii. 344; Brew. & Wats., l. c.; Coulter & Rose, l. c.

3. A. Oregana (Nutt.) = *Edosmia Oregana*, Nutt., Herb.: *Carum Oreganum*, Watson, Proc. Am. Acad. xx. 368; Coulter & Rose, l. c.

4. A. Howellii (C. & R.) = *Carum Howellii*, Coulter & Rose, Revis. Umb. 129.

The above selection, out of a very considerable accumulation of notes upon Californian plants of this order, have been called into print somewhat in advance of what would have been their time, by my perusal of the interesting monograph with which Messrs. Coulter & Rose have lately furnished us,

i. e. their Revision of North American Umbelliferæ, an excellent work resulting from what must have been many months of careful and persevering toil in the herbarium and laboratory, as well as in those portions of the great living field to which they have had access.

We note with special satisfaction the admission made in this monograph, that for limiting genera one may, and now and then must, rely upon such obscure and intangible characteristics as habit—the "facies" of a plant or an assemblage of plants. This is a going back, away beyond Linnæus, to the time and to the express teaching of our patron saint in botany, the immortal Pitton de Tournefort, who "founded genera."

We are less satisfied with Messrs. Coulter & Rose's neglect of matters bibliographical and historical. We think the time is coming when the authors themselves will regret having encumbered their pages with scores of names, and even some synonyms credited to authors who did not make them. All this kind of doing is sufficiently disapproved when shown to be inaccurate,—untrue to the records of science. But, if our monographers have credited "Benth. & Hook." with many things those authors did not do or say, we are pleased to see that they have in their own field asserted a judgment of their own in many instances, as against the opinions of the learned British botanists. They have studied well their Bentham & Hooker, but appear to have ignored Baillon's magnificent work altogether; a treatise which we venture to say, no student of genera who would be thorough, can afford to neglect. Thus, our authors have credited themselves and Mr. Bebb with the restoration of *Zizia*, after Mr. Bentham had reduced it to *Carum*. But M. Baillon had made this restoration and had thoroughly defended the genus, ten years before.[1]

The Historical Sketch begins with this kind of an inaccuracy: "The plants of this order were first set apart under

[1] Baillon, Hist. vii. 120.

the ordinal name *Umbellifere* by A. L. de Jussieu in his *Genera Plantarum*, published in 1789."[1]

Full twenty-three years before the issue of Jussieu's genera, Henry J. N. Crantz, a learned botanist and a man of striking originality, whose long neglected works are now regaining a deserved place in the esteem of all botanical systematists, published in his *Institutiones Rei Herbaria*, exactly this order of plants under the now familiar and universal name *Umbelliferæ*. Adanson three years before Crantz headed his dissertation upon the order, with the French, "Les Ombelliferes," preceding the Latin, "*Umbellatæ*." But still ten years earlier than Adanson, the celebrated Albert Haller, in the *Enumeratio Plantarum Horti et Agri Gottingensis* precisely limited this order and called it *Umbelliferæ*. I think he was the first; so that the order, strictly limited to true Umbelliferæ and so named, dates from the publication of Haller's Hortus Gottingensis, in 1753; Crantz having followed him in 1766, and Jussieu in 1789.

Botanical Nomenclature in North America.

[From the *Journal of Botany* for November, 1888; reprinted here by request of subscribers to Pittonia.]

Light and help on the subject of nomenclature we long since learned to expect from every paragraph thereon which might emanate from the editorship of this Journal. Certain recent animadversions[2] are not in this regard a disappointment. The article upon which it seems needful to offer one more word of comment is, upon the whole, a very instructive

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[1] Revis. Umb. p. 4.

[2] Journ. Bot. 1888, p. 257.

one, and we have welcomed it, notwithstanding that it bears rather heavily upon some of us in America.

Without asking for space in which to discuss a number of interesting propositions set forth by Mr. Britten in the body of his article. I must be permitted to try to correct a wrong impression which will have been made by his opening paragraph, feeling confident that he, no less than others, will welcome the correction.

It is quite erroneous to say, as the Editor does say, implicitly, if not in just so many words, that, while an older generation of American botanists have been and are governed by established laws in nomenclature, a new school has arisen whose aim is to introduce a new system, one which is thought objectionable as bringing in "fresh elements of confusion."

Not to pause for a moment in explanation or defense of a system which, so far from being new, our esteemed critic himself knows to have been long recognised and adhered to as the correct one, in almost every one of the great branches of systematic biology outside of the one department of phanerogamic botany; in which latter branch, even, it has had respectable advocates; I am only called upon to show that no contrast quite so striking really exists between the practices of ourselves of the "new school," if so we are to be called, and those of our elders.

We are censured in this; that we suffer ourselves to be governed by the principle of priority in relation to specific, as well as generic, names. Since we had to be subjected to an ordeal so rather trying as that of a comparison of our own wisdom and discretion with those of our fathers,—for by such comparison the younger inevitably, and perhaps always more or less justly, suffers,—it might have been well to mention the one thing wherein we should seem commendable above those who have gone before us, *i. e.*, our resolute defence of, and abiding by, the law of priority in generic names. The earlier race of American botanists herein exhibit a laxity of view, with which our own strictness forms a contrast; and it is not from any representatives of an old school in America that

Issued March 30, 1889.

such genera as *Hookera* and *Castalia*, which the Editor of this Journal has so clearly shown to be of obligation under the law of priority, will meet with approval and adoption. The remnant of that party here resists these reinstatements with whatever it has retained of its former influence and authority.

Against the practice of restoring old specific names in those genera when new ones had been made to replace them, it must be admitted that Dr. Gray sometimes argued, "with his wonted care and ability," in divers journalistic paragraphs; and our friends in England, not having looked into his books to see how very often, through successive pages of plant-naming and describing, he adopts the very practice which he disapproves in others, imagine that here they have made a point against us. We would, therefore, invite attention to Dr. Gray's nomenclature of any of the genera of the Synoptical Flora, in which there are Linnæan species now placed in other genera. Take the *Ericaceæ* for an example. There is *Rhododendron*, at present made to include the species of the Linnæan *Azalea*. There are named and described five species of the *Azalea* subdivision. Every one of them had received its first specific name under *Azalea*. To four out of the five, new specific names had been given upon their introduction into *Rhododendron;* but, in each of these four instances, our author has rejected the "first name which the species received under its proper genus," adopting that more recent combination which embraces the old specific name under *Azalea*. One of my colleagues in America has lately adverted, incidentally, to the case of *Moneses*,[1] in which Dr. Gray, as long ago as 1847, set aside his English namesake's *M. grandiflora* (S. F. Gray, Nat Arr. ii. 403), and rehabilitated the little plant in its old Linnæan (yea, pre-Linnæan) specific name, making the new combination *Moneses uniflora* A. Gray. And these which I cite are but fair samples of Dr. Gray's occasional practice when the species are old, and have received

[1] Bull. Torr. Club, 1888, p. 230.

several specific names. Whatever may have induced him now and then, in critical essays, to write in disparagement of this usage, one who studies him in his books and monographs must see that he not only had a very strong predilection for the oldest specific names, but was willing to transgress rules which he professed to respect and be governed by, in order to keep such names in use.

Dr. Watson, who is also cited as if exemplifying more approved methods in nomenclature, has made himself, in some of his pages, a luminous example of our "new school" usage. For a good illustration, we have but to advert to his readjustments in the specific nomenclature of *Onagraceæ*, in the first volume of the Botany of California. Spach, in proposing the genera *Godetia* and *Boisduvalia*, had dropped a number of very old specific names which the plants had been known by under *Œnothera;* and Dr. Watson, with what we, his American colleagues, consider a commendable zeal for thorough priority, restored those old neglected names, every one; and so we read, in the place referred to, *Godetia purpurea* Watson instead of the much older combination *G. Willdenoviana* Spach, *G. tenella* Watson instead of *G. Cavanillesii* Spach, *Boisduvalia densiflora* Watson in place of *B. Douglasii* Spach, and so on.

I shall be far from asserting that our elders have followed this rule. On some of their pages they conform to this, on others to some other, and the having of so many rules is equivalent to having none at all. That this is the true condition of botanical nomenclature in America, with all authors, up to a somewhat recent date, one has but to look into our most pretentious treatises to see. I have been constrained lately to remark this unhappy fact.[1] For any two or three botanists to have settled down to any one particular usage, or to have subjected themselves to any code whatever, would have been to form, in America, a "new school." A number of us young workers have, in so far as I know, without any

[1] PITTONIA, i. p. 185.

mutual understanding or agreement, one after another, placed ourselves under obedience to the simple law of priority in nomenclature; and, be our action commendable or be it deprecable, it does, we confess it, place us in contrast with the earlier generation, whose misfortune it may have been to have had us in training.

Baron von Mueller on Early Binomials.

At the time of my writing the paper on Ray's Catalogus, while I was well aware that Baron von Mueller approved the restoration of the names of old authors, I did not know that he had written so much or so strongly on that subject as he has done. In a recent letter he has kindly called to my notice pages 37 to 40 of his first paper on Papuan Plants, published in 1875. I am glad to be able to invite the attention of other American botanists who may not have read them, to these pointed suggestions, and especially to the extended list there given of binary names adopted by Linnæus from earlier botanists.

New or Noteworthy Species.

IV.

Unifolium sessilifolium (Nutt.) Greene. A foot or two high, the upper two thirds of the flexuous stem horizontally or somewhat arcuately spreading, the leaves distichous.—Bull. Torr. Club. xv. 287: *Smilacina sessilifolia*, Wats. Bot. Calif. ii. 161, in part, but there confused with the following:

Unifolium liliaceum. From 1½ to 3½ feet high, strictly erect, not at all flexuous, nor the leaves very perceptibly

distichous, being scattered almost equably on all sides of the stem: leaves 3—8 inches long, oblong-lanceolate, acuminate, all but the lowest distinctly falcate at apex: raceme erect, simple, lax, few-flowered, the lower pedicels often an inch long.—*Smilacina stellata*, Wats. Bot. King. 345, not of Desfontaines.

A species inhabiting the higher Sierra in California, extending northward indefinitely; common and rank in the woods of northern California and southern Oregon; perhaps occurring in Macoun's collection made on Vancouver Island in 1887 (but his plant, distributed as *S. sessilifolia*, has foliage less falcate and quite distinctly 2-ranked); extending eastward, it may be to the mountains of Utah. Differing widely from the true *U. sessifolium* (which is confined to the Coast Range of California), as will be seen by comparison of the specific characters above given.

Both these western plants differ from the eastern *U. stellatum*, in being glabrous and of a bright shining green with nothing of the glaucous. *U. stellatum* is both pubescent and glaucous; so that, in color of herbage, it is very unlike its Pacific allies. Its foliage is also of a different outline.

The fruit of *U. stellatum* is described as purplish black. That of *U. sessifolium* is of a bright clear red. No one appears to have observed the berries of *U. liliaceum*. I name it in allusion to that very lily-like aspect the plant wears before flowering; the large scattered leaves adorning all sides of the stem, as they do in any lily, but in no other *Unifolium*.

URTICA CALIFORNICA. Stoutish and not tall (2 or 3 feet high), very hispid: stipules large, narrowly oblong: leaves broadly or somewhat deltoidly ovate, acute, cordate at base, 3—5 inches long, very coarsely toothed, ascending or spreading on stoutish petioles 1—1½ inches long: sepals broadly ovate, little exceeding the broadly ovate, minutely punctate achene which is little more than ½ line long.—*U. Lyallii* in part of Watson (?).

Borders of thickets near streamlets on the seaward slope

of the Coast Range in San Mateo County, California, 10 June, 1887. Collected by the writer, and distributed under the name *U. Lyallii*, from which its low stature, firmer, broader and somewhat angular foliage, as well as its broader achene, puncticulate under a lens, make it readily distinguishable.

HESPEROCHIRON CILIATUS. Leaves rather few, the blade oblong, obtuse, less than an inch long, tapering to a winged petiole of twice its own length, the margins closely and somewhat retrorsely ciliolate, the whole herbage otherwise glabrous: peduncles very slender, exceeding the leaves: calyx parted to the base, the segments linear-oblong, ciliotate: corolla apparently small and little surpassing the calyx.

Soda Springs of Esmeralda Co., Nevada (altitude 4500 ft.); collected in April, 1888, by Mr. W. H. Shockley. The species well marked by its slender habit, and small flowers borne on almost filiform peduncles longer than the leaves. The peculiar ciliation of the otherwise glabrous leaves is very characteristic.

PENTSTEMON ARENARIUS. Stems tufted and low (a foot high), stoutish, pale green, glabrous and viscid: leaves lanceolate, coarsely callous-toothed, the cauline an inch or two long, sessile: thyrsus short, leafy bracted: sepals lanceolate, acute, scarious-margined, their tips lax and apt to be recurved: corolla flesh-color, a half inch long, narrowly funnelform, the lobes short, spreading: sterile filament as long as the others, heavily bearded at tip.

At Belleville, Esmeralda Co., Nevada, W. H. Shockley (No. 348). Allied to *P. deustus*, but a very viscid plant, the specimens coated throughout like sand-paper, with the desert sand in which they grew.

MIMULUS GLAREOSUS. Annual, slender, diffuse, the branches a foot long or less: retrorsely pubescent and viscous: leaves round-ovate, $\frac{3}{4}$ inch long, on slender petioles of equal length,

irregularly toothed or slightly lobed and usually with a row of purple spots across the basal part of the lamina : pedicels very slender, far exceeding the leaves : calyx-teeth unequal, the uppermost of the five much the largest : corolla strongly bilabiate, $\frac{1}{2}$—$\frac{3}{4}$ inch long, yellow, with purple dots.

Gravelly margins of mountain streams in Lake County, California, August, 1888. Most related to *M. laciniatus* of the Sierra Nevada ; the calyx like that of *M. nasutus*.

NAVARRETIA LEPTANTHA. Near *N. atractyloides* and as large, but slender and rather diffuse, viscid puberulent and heavy-scented : leaves with a lanceolate rachis and spinose-subulate very rigid segments in 3—5 pairs : segments of the calyx erect, spinose-subulate, entire, 2 twice as large as the others : corolla deep purple, salverform, the tube almost filiform and more than a half-inch long.—*N. hamata* in part. of page 139.

Collected at All Saints Bay, Lower California, by the writer, in 1885 ; also a year later, in the same locality, by C. R. Orcutt. Having taken but a single specimen, I placed it under *N. hamata* at the time of writing the earlier article upon *Navarretia ;* but I did so with much reluctance, on account of the large corollas with greatly elongated tube. Mr. Orcutt's specimens confirm the plant as a distinct species.

SERICOCARPUS TOMENTELLUS. Two or three feet high, the inflorescence and lower face of leaves tomentulose : leaves coriaceous, an inch long or more, oblong or oblong-lanceolate, acute, entire, closely sessile by a broad base, spreading or deflexed, indistinctly feather-veined : heads paniculate, a half-inch high ; scales of the hoary-tomentose turbinate involucre narrowly oblong, acute : rays none ; achenes sparingly villous ; pappus dull or tawny.

Coast Mountains, near Waldo, Oregon, July, 1888. Thomas Howell. A quite remarkable plant, in which there ia a blending of some characteristics of *Machœranthera* and of *Corethrogyne*, with those of the genus to which it undoubtedly belongs.

BÆRIA CONSANGUINEA. From 6 to 10 inches high, minutely glandular and sparingly hirsute: leaves lanceolate-acuminate, entire, sessile and apparently connate at the very base: rays conspicuously exserted: achenes minute, hispidulous-roughened, bearing a pappus of 5–8 quadrate scales which are deeply laciniate-toothed across the summit.

A Lower Californian species, collected by Mr. Orcutt in 1886. It forms a connecting link between the *Dichæta* and *Ptilomeris* sections of the genus; having the entire foliage of a *Lasthenia*, however, or of typical *Bæria*, but the fruit of *Ptilomeris*. The whole achene, pappus included, is barely a line long.

HELIANTHUS (?) INVENUSTUS. Apparently tall, leafy up to the solitary very short-peduncled heads, hispidulous throughout, the younger parts white-setose: leaves deltoid-lanceolate, entire, 4 or 5 inches long, on petioles of an inch or two: heads solitary, an inch high: rays none; disk-corollas tubular: achenes (too young) apparently quadrangular, compressed, without pappus, or some with a single caducous scale (?).

Mountains of Kern County, California, 1888, Dr. E. Palmer (No. 105).

Root unknown; plant with the aspect of some of the coarse annual species of *Helianthus*, nevertheless probably perennial. Perhaps a member of the too artificial genus *Balsamorrhiza*, but there are no known species with this habit.

DELPHINIUM PAUPERCULUM. Stem solitary. simple, 2 or 3 leaved, 6–10 inches high, from a small globose or ovate tuber: pubescence sparse and soft: leaves parted into broad linear trifid segments: flowers only 3 or 4, on ascending pedicels, deep blue, an inch broad; spur ascending, straight.

Near the sea coast, in Washington Territory, July, 1888, Mr. M. A. Knapp.

DELPHINIUM RECURVATUM. Perennial, the root a fascicle of fleshy-fibrous thick roots: a foot or two high, strict and simple, or branching and the racemes more lax, glabrous and glaucous, except a sparse pubescence on the lower face of the leaves and the petioles: leaves divided, each part cleft into about 3 linear obtuse mucronulate segments, those nearest the root on elongated petioles: raceme many-flowered, the pedicels ascending, an inch long: flowers lavender-color (changing to pale blue in drying), the linear-oblong sepals more than a half-inch long, conspicuously recurved, the blunt spur about as long and curved upwards.

Frequent in moist subsaline grounds along the San Joaquin River, in California, from Antioch to Tulare, flowering in March and April.

DELPHINIUM APICULATUM. Root as in the preceding: a foot or two high, strict, simple, few-leaved, roughish throughout with a short spreading or retrorse pubescence: leaves repeatedly subdivided into linear segments: raceme dense, 4—6 inches long, flowers dark blue; sepals oval, $\frac{3}{4}$ inch long, with a conspicuous cusp and (in the fresh flowers) with a red spot below it.

Plains of the San Joaquin near Byron Springs, abundant, flowering in March and April. A very beautiful species whose nearest relative is *D. variegatum*, from which it differs in its strict and many-flowered racemes of smaller flowers, a more slender habit, etc. Its habitat is also different, the other being a plant of the sea coast.

COTYLEDON LINEARIS. Light green and not farinose, only the inflorescence somewhat glaucous: stem very short, caespitous-branching: leaves numerous, crowded, erect or somewhat spreading, 2 or 3 inches long, linear or nearly so, acuminate, 3—6 lines wide and half as thick: flowering branches less than a foot high, rather slender, bearing ovate bracts and 2 or 3 simple racemes: floral bracts equalling or exceeding the pedicels: sepals ovate-lanceolate, 3 lines long: corolla

Issued April 16, 1889.

greenish yellow, segments erect: stamens nearly equalling the corolla; anthers small, orbicular.—*E. lanceolata* of page 264 preceding.

Probably common on the Lower Californian islands and shores. The description is drawn from Lieut. Pond's San Benito specimen, now in flower. The anthers of *C. lanceolata* are linear-oblong, and its filaments are much shorter; but the difference in form of leaves, etc., is very considerable.

SAXIFRAGA CALIFORNICA. Perennial, fibrous-rooted and propagating by small oblong tubers produced at the ends of filiform subterranean branches: stem scapiform, 6—18 inches high, bearing a loose cymose panicle of bracteolate and few-flowered racemes: leaves oval, oblong or elliptical, an inch or two long, on broad petioles half as long, the margin from coarsely crenate to somewhat repandly denticulate, or almost entire, both surfaces more or less pubescent and the margin ciliolate-tomentose: calyx free from all but the base of the ovary, the sepals reflexed: petals white, narrowly elliptical or a little spatulate below, $1\frac{1}{2}$ lines long, obtuse at apex: stamens 10; filaments filiform or flattened; anthers roundish, dark-red: styles erect and approximate in flower, carpels at length divergent.—*S. Virginiensis*, Boland, Catal. 11; Brew. & Wats. Bot. Calif. i. 194, not of Linn.

Very common in the central parts of California, in the Coast Range especially. It was latterly referred by Dr. Gray to *S. reflexa*, Hook., but apart from the reflexed sepals it is more like *S. Virginiensis*. It is, however, quite distinct from both; and its propagation by tubers has hitherto remained unnoticed. These are scarcely to be observed in the most carefully preserved herbarium specimens, because of the delicacy and fragility of the subterranean branches which bear them. In the fresh flower the summit of the ovary appears as if very broad and flat; but this is owing to the presence of a partly epigynous nectariferous disk the margin of which coheres with the calyx and touches the base of the filaments. The floral structure in *S. reflexa* is not in the

least like this, whatever it might be in *S. Virginiensis*. Our plant is abundant on the Mission Hills in San Francisco; also on the northward slope of Mt. Tamalpais, and is frequent in the Mt. Diablo Range. It extends northward at least to Humboldt Co., Calif., and probably into Oregon. Of its limits southward I have no certain knowledge. I saw what I assume to be the same, on the mountains back of Santa Barbara, and the "*S. reflexa*" of Orcutt's Catalogue of San Diego County may be the same.

Some Plants from the Bay of San Bartolomé, Lower California.

Lieutenant Pond, who recently made so valuable a contribution to our knowledge of the botany of two Lower Californian islands, has now sent us quite as interesting a collection from the vicinity of San Bartolomé Bay, a part of the main-land which has hitherto remained unexplored. The specimens were collected in the month of March, 1889, and all of them from "low plains around the southern shore of the Bay."

The list which follows contains a very large proportion of new species, besides greatly extending the known geographical range of several others which have long been known.

1. Arabis pectinata. Annual, glabrous, glaucous, a foot high, erect, simple or with several loosely racemose flowering branches: leaves 2 or 3 inches long, consisting of a linear rachis and 5—7 pairs of linear-filiform divaricate segments which are slightly dilated at tip: racemes 6—10 inches long, the pedicels $\frac{1}{2}$ inch long, horizontally spreading in flower, recurved in fruit: sepals purple, $1\frac{1}{2}$ lines long; petals 3 lines, white.

A most singular and beautiful species; but closely related to *A. filifolia* of Santa Cruz Island (see page 30 preceding; also Bull. Calif. Acad. ii. 390).

2. Astragalus Pondii. Annual, much branched from the base, the branches a foot long, ascending; herbage cinereous-strigillose: leaflets in 8 or 10 pairs, a half inch long, linear-oblong, acute; racemes short-peduncled, 5—15-flowered: flowers very small, purple: pods 1-celled, membranaceous or somewhat chartaceous, inflated, minutely purple-dotted, ¾ inch long, ½ inch broad, with an abrupt triangular straight acumination.

Species near *A. trifloras*, but the pods smaller and apiculate, besides being purple-flecked. They are short-ovoid as seen from above; the side view being semi-obovate.

3. Phaseolus filiformis, Benth. Bot. Sulph. 13. A slender annual species, with entire or 3-lobed leaflets, purple flowers, and pendulous falcate pods an inch long. The species is to be added to the list of Cedros plants; for the good flowering and fruiting specimen now in hand from San Bartolomé enables me to identify the plant in a very young state which Lieut. Pond sent from Cedros in January.

4. Hosackia maritima, Nutt., Torr. & Gray, Fl. i. 326.

5. Lupinus Pondii. Annual, much branched from the base, a foot high, rather slender, sparsely hirsute: petioles slender, an inch long, or more; leaflets about 7, ½ inch long, cuneate-oblong, very obtuse or even truncate: racemes scarcely peduncled, short, the flowers scattered, 5 lines long, purple, the banner with a green spot in the middle which changes to red-purple; keel but slightly falcate, naked: lower lip of calyx entire, the upper mainly scarious, parted almost to the base: pod ½ inch long, 4-seeded: seed round-ovoid, scarcely a line long, smooth, green-dotted and marbled.

A very handsome species, related to the rare *L. gracilis*, but with different foliage and a very different calyx.

6. Calandrinia maritima, Nutt., Torr. & Gray, Fl. i. 197. Lieut. Pond has now secured perfect specimens of this rare and interesting plant. In them I observe that the dark wine-colored corolla is marcescent-persistent upon, and calyptrately closed over the growing ovary, being thrown off only upon the opening of the ripe capsules.

7. Fouquiera spinosa, HBK. N. Gen. et Sp. vi. 84. t. 528 ?. The specimens, in flower only, do not quite agree with Kunth's description, nor yet with the more common *F. splendens*.

8. Abronia umbellata, Lam. Ill. i. 569. t. 105.

9. Suæda Moquini (Torr.), Greene, Pittonia, i. 264 ?. In the present specimen from San Bartolomé. the ripe seed is smooth and shining; the identification of it with Dr. Torrey's *Chenopodina Moquini* is therefore doubtful.

10. Eriogonum intricatum, Benth. Bot. Sulph. 46. t. 22. Very young, but showing well the involucres and flower-buds. The leaf outline is not quite like that given in the plate referred to; for the lamina tapers into the slender petiole, and so, in this specimen at least, would be described as cuneate-obovate. The locality is the original one; just where Hinds obtained it, and where it is somewhat strange that he, the pioneer of Lower Californian botany, did not obtain the following:

11. Eriogonum Pondii, Greene, Pittonia, i. 267. The flowering branches less stunted than in the original from Cedros. Lieutenant Pond now describes the whole plant as "growing in thick matted clumps about two or three feet in diameter, and as high; thickly covered with the small flowers." It must therefore be a rather pretty species.

12. Euphorbia Bartolomæi. Annual, prostrate, the branches almost filiform and sparsely hirsute with very white hairs: leaves very small, round-ovate, entire, veinless, nearly equal-sided at base: stipules minute, setaceous, entire, ciliolate, apparently deciduous: flowers few, large for the plant: glands dark red-purple, transversely oblong or somewhat reniform, adorned with a conspicuous dilated white or pale rose-colored appendage of which the margin is entire, crenate or sometimes deeply lobed: capsule pubescent: seed $\frac{1}{3}$ line long, almost white, angled rather sharply, strongly rugose.

The whole plant, apparently full grown, measures barely two inches from tip to tip of the prostrate branches. The species is related to *E. setiloba* and *E. versicolor*.

13. Œnothera crassiuscula. Annual, stoutish and a little succulent, a foot or two high with a few rigid virgate branches, glabrous and glaucescent: leaves 2 inches long, narrowly lanceolate, sinuately lobed or toothed: calyx-tube short campanulate: petals an inch long, light yellow: pods sessile, quadrangular, contorted: seeds linear-oblong, smooth, purple-dotted.

The essential character of Nuttall's genus *Eulobus* is the short calyx-tube lined with a disk. The present species is of that genus, if the genus be retained. So is also another Lower Californian plant of my own discovery, *i. e.*, *Œ. crassifolia* (Bull. Calif. Acad. i. 188); but the view of M. Baillon, which places *Eulobus* in *Œnothera*, seems hardly controvertible, and the type-species must be named *Œnothera Californica* (Nutt.).

14. Encelia conspersa, Benth. Bot. Sulph. 26.

15. Franseria chenopodiifolia, Benth. loc. cit.

16. Coreocarpus involutus. Annual, erect, slender, 6 inches high, glabrous, with 3 or 4 pairs of opposite bipinnately

dissected leaves and a few showy heads on slender peduncles: involucral bracts few, in a single series, obovate-oblong acute, and, with the outer series of receptacle-chaff, purple-lineolate: rays conspicuous, golden-yellow: ray-achenes cuneate-oblong, abruptly incurved at the apex, the crenulate margin involute all around; disk-achenes narrower, straight, their margin very narrow or obsolete.

17. DYSODIA ANTHEMIDIFOLIA, Benth. Bot. Sulph. 29.

18. PERITYLE FITCHII, Torr., Pac. R. Rep. iv. 100.

19. CHÆNACTIS LACERA. A foot high or more, the several stoutish branches from an annual root; canescently farinose below, the inflorescence viscid: lower leaves 3 or 4 inches long, ovate-lanceolate in outline but divided and subdivided into linear divaricate or slightly retrorse segments; heads large, in a loose terminal corymb: flowers all alike, white: achenes clavate-linear, hispidulous, not angled, crowned with a thin-hyaline pappus of 8 or 10 lanceolate acute or acuminate scales which are sharply and minutely lacerate-toothed or fimbriate.

Of the Acarphæa group, but with a peculiarly skeletonized foliage and a very beautiful pappus.

20. RAFINESQUIA NEO-MEXICANA, Gray, Pl. Wright, ii. 103. An unexpected habitat for this species. It is very distinct from the typical *R. Californica*.

21. CRYPTANTHE MARITIMA, Greene, Pittonia, i. 117.

22. CRYPTANTHE PONDII. From a few inches to nearly a foot high, rather slender, sparingly leafy and setulose, the leaves narrowly linear, an inch or two in length: spikes terminal in threes or fours on a short common peduncle, remotely bracteolate, the bracts hardly surpassing the calyces, these crowded, a line long, villous-setose but not at all hispid, persistent and open in fruit: corolla rather large: nutlets 4,

smooth and shining, ½ line long, ovate-lanceolate, the groove closed, divaricate at the very base.

Plant with the habit, aspect and persistent open calyx of the Pterygium section, but with the nutlets of *C. leiocarpa*.

23. Cuscuta patens, Benth. Bot. Sulph. 35.

24. Lycium brevipes, Benth. Bot. Sulph. 40.

25. Triteleia (?) Palmeri (Wats.) = *Brodiæa Palmeri*, Proc. Am. Acad. xxiv. 78. Corm none: roots slender-fibrous from a very short or obsolete rhizome: leaves linear, sheathing the base of the scape and bearing bulblets in their axils: scape naked, with a terminal umbel subtended by scarious spathaceous bracts: perianth regular, articulated with the pedicel: the segments connate below into a turbinate tube: stamens 6, equal, all alike antheriferous; filaments filiform, coherent with the tube of the perianth, free and distinct above it: anthers linear, basifixed: ovary stipitate, 3-celled; style slender, persistent: capsule obovate-triquetrous, enclosed in the violet marcescent perianth, about 12-seeded.

With the exception of the basifixed anthers and a short coroniform appendage of the perianth-tube, both the inflorescence and the individual flower of this curious plant are almost precisely those of the common Californian *Triteleia laxa*. At the same time the vegetative characters are so different that the placing of the species as congeneric with either *Brodiæa* or *Triteleia* seems a violation of the very first principles which have hitherto governed men in the classification of liliaceous plants. Corm-bearing and merely fibrous-rooted species nowhere go together in one genus. Such differences are more than generic,—even subordinal or tribal, according to the received opinions of the best botanists. Nevertheless, one can not dispute the real and close affinity between this odd plant of the Peninsula, and the familiar corm-bearing Alliaceæ of California.

Analogies and Affinities.

I.

That familiar tenant of summer pools and muddy shores, the common Water Plantain, known to the botanists of two hundred and fifty and three hundred years since by the name *Plantago aquatica*,[1] which Linnæus, to perpetuate the old name called *Alisma Plantago aquatica*[2] (the emendators of Linnæus having cut it down to the strict binomial *Alisma Plantago*[3]), bears only the most superficial likeness to certain species of *Plantago*. Such a name for the plant, and such a place in the system of vegetal forms could have been assigned it only by men who had yet to learn that the marks of general affinity lie not in the mere externals of leaf-outline, venation, habit, or habitat.

In the year 1583 the Italian Cæsalpinus enunciated the principle that in the fruit and seed of plants are to be found the true indices of affinity; a principle which lies at the bottom of every system of plant classification which has since been proposed; and the discovery entitles Cæsalpinus to the honor of having been the founder of the science of systematic botany.

The Cæsalpinian teaching having been received, it was inevitable that the Water Plantain should be dissociated from the species of *Plantago*. In its fructification it had nothing

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[1] Brunfels, i. 24 (1530); Ruellius, 574 (1536); Fuchs, 42 (1543); Tragus, 226 (1552); Camer., 264 (1558); Dod., 606 (1583).

[2] Linn., Sp. Pl. ed. 1, 342 (1753); Crantz, Inst. ii. 449 (1766); Hill, Hort. Kew. 161 (1769); Gærtn., Fruct. et Sem. ii. 22 (1802).

[3] Scopoli, Carn. ed. 2. i. 266 (1772); Ait., Hort. Kew. i. 492 (1789); Mœnch, Meth. 219 (1794).

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in common with that genus. Whither should it be transferred? No student or amateur who is familiar with certain plantain-leaved and white-flowered species of crowfoot which inhabit certain mountain districts of the Old World, should be surprised to learn that our present *Alisma*, on being removed from *Plantago* was first placed in the genus *Ranunculus*.[1] Men had not yet learned to distinguish the two great classes, monocotyledonous and dicotyledonous, of the phanerogams, and so, the reference of *Alisma* and *Sagittaria* to *Ranunculus* was, in the light of that still early day, quite rational and scientific. The distinct hypogynous deciduous sepals, petals and stamens, and the heads of compressed achenes are much the same thing in *Ranunculus* and *Alisma;* but one is a genus of exogens, the other, of endogens; and the interior of the seed being overlooked, we have quite a congeneric similarity in the anthology and carpology of the two; but the resemblances are those of analogy merely, not of affinity.

The day will not return when great and learned and philosophical botanists will approve such a thing as the fusion of *Alisma* and *Ranunculus* in one genus; but one might dare to predict a time when men will have come to regard many of our accepted, families, genera, and species even, as having been quite as artificially compounded as the *Ranunculus* of Tournefort.

The natural system of botanical classification will never be perfected,—is not likely to be advanced much beyond its present halting stage,[2] until botanists shall recognize the fact that mere morphology, whether of flower or fruit, is not always a sure criterion of affinity; that while similar anthological and carpological characters do most commonly indi-

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[1] Tournefort so disposed of the plant, calling it *Ranunculus palustris, Plantaginis folio ampliore* (Inst. Rei Herb. 292), and he had a following in the matter, but for a few years only.

[2] The modern decline of interest in systematic botany has been publicly noted by many writers, and more talked of and deplored in secret converse, among the survivors of an elder generation.

cate close genetic relation, they are also not rarely, perhaps very frequently, mere analogies, purely imitative resemblances.

This is touching upon one of the hard problems of botanical science. The great desideratum is a rule by which the so-called "characters" of families, genera and species may be distinguished, the true from the false, and the real marks of relationship be sifted out from among the mass of analogies,—mere simulations, with which they are, as they have always been, confounded by the most consummate masters of systematic botany,—confounded because there is apparently no way of determining when or where a given characteristic is of analogy, or when or where it of affinity. My own purpose in initiating a series of papers upon Analogies and Affinities is simply to give forth facts and impressions[1] of my own, and of other people, in hope that the more capable may take up the subject and pursue it to better purpose.

To begin with: I have been for some years awake to a sense of the very close consanguinity which appears to subsist between the Lobeliaceæ and those plants which figure in most of the books as a suborder or tribe of Compositæ, the Cichoriaceæ.

Without having mastered all that may have been written upon the properties of plants in relation to their affinities, but not without much personal observation continued through many years, I am of the mind that like properties are more often of affinity and more rarely of analogy than is generally allowed. The acrid-narcotic qualities of the milky juice are identical in Lobeliaceæ and Cichoriaceæ; and, if certain Arctotideæ, only artificially distinguished from Cichoriaceæ by their heterogamous heads, be joined to them, they stand

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[1] "It is one thing to perceive affinities, the power to do which is intuitive and possessed in very different degrees by different persons, the child often detecting a consanguinity where the sage fails to see it when pointed out to him; it is another thing to seize the clues to such affinities," etc. –Sir J. D. Hooker, *Classification of Plants;* in appendix to English edition of Le Maout & Decaisne, p. 994.

naturally aloof from all other Compositæ. *Lobelia urens* and *Lactuca virosa* of the Old World are well known exponents of the property referred to; and Father Feuillée's account of the effect of inhaling the odor of *Lobelia Tupa*[1] might be repeated concerning one of our commonest Californian Cichoriaceæ, *Rafinesquia*, a rank lettuce-like weed of the bushy hill-sides, from the odor of which, when perchance I have bruised the herbage with my foot, I am obliged to retreat for my head and stomach's sake.

Cattle and horses, whether they find in these plants a palatable nutritive, a soothing narcotic or some remedial virtue, often devour them with greed; and the instinct or appetite leads them to feed without any discrimination upon either the lobelia or lettuce worts. I have repeatedly observed small lobelias and coarse sonchus and stephanomeria cropped closely, where other well known forage plants were not at all kept down in that way by the ruminants at large upon the ground. On the Island of Santa Cruz I observed that, under circumstances of some dearth of Cichoriaceæ, and a total absence of the Lobeliaceæ, *Rafinesquia*, notwithstanding its extremely nauseating odor, and probable virulent qualities, had been browsed upon quite freely by the sheep. If there had been on this island any marshes or brook-sides with lobelias, it is undoubted in my mind, the sheep would have preferred them.

In that hardly definable, but if delicate yet most certain index of consanguinity which we call habit, the Lobeliaceæ and Cichoriaceæ are very much alike. On the Pacific side of North America where the latter superabound, the resemblance is often very close, so much so that some species when not in flower or fruit might easily be referred to the wrong family. A few summers since, while botanizing up along a streamlet of the mountains near Santa Barbara, I found the moist bank all at once covered over with the stubbly remnants of a leafy herb which the cattle had eaten off, in preference

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[1] "Its root yieldeth a deadly milk, as also doth its stem; the odor of its flowers produceth cruel sickness." –Bot. Reg. under t. 1612.

to the grasses and the sedges. From the aspect of the leaves I inferred the plant to be some lettuce wort either new to science, or at least to me unknown. Breaking off one of the stubbly stems, there exuded the expected milky juice, and I felt even more confident that I had before me some curious thing of the lettuce family, and this illusion was not dispelled until I drew near a rocky chasm where, out of reach of the ruminants, my new plant bloomed a most beautiful blue *Lobelia*.[1] I had forgotten that, in these Santa Barbara hills, I was upon the native ground of one of the types of the entirely artificial genus, *Palmerella*.

Experiences akin to this have not been rare with me; and I have come to associate these two families of plants in my mind as related in a degree far more intimate than many herbarium botanists are likely to have thought of, or to be able to appreciate. But there is at least one good morphological point of affinity between the two to which I would call renewed attention. It has long been known that while the pollen of all other tribes of Compositæ is globular or merely somewhat elongated, that of the Cichoriaceæ is distinctly and invariably dodecahedral; a most remarkable and very fundamental morphological difference; such as no student of affinities can afford to overlook; and the same thing is more or less characteristic of at least a goodly number of the Lobeliaceæ. Many of the genera exhibit a decidedly angular pollen; few that I have examined, a globular grain.

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[1] Lobelia Rothrockii = *Palmerella debilis* var. *serrata*, Gray, Wheeler's Report, 367. I recognize this as quite specifically distinct from the type of *Palmerella*, which latter should be dedicated to its real discoverer, Geo. W. Dunn, under the name

Lobelia Dunnii = *Palmerella debilis*, Gray, Proc. Am. Acad. xi. 81: Bot. Cal. i. 619.

A third member of this group of Lobelias with long, slender and uncleft corolla tube may be called

Lobelia Palmeri = *Palmerella tenera*, Gray, Proc. Am. Acad. xxii. 433.

All these western plants have, as regards the accidental peculiarity of their corolla, a counterpart in the Atlantic American *L. amœna*, as M. Baillon has said.

In fine; the evidences of close consanguinity between all these plants are with me so conclusive that I venture to give expression to what has long been a settled conviction, that the resemblances which the flowers and fruits of the cichoriaceous alliance bear to the other "Compositæ" is altogether of analogy; purely imitative; and that the Cichoriaceæ are perfectly distinct Natural Order.

There are few among my readers who will need to be informed that this is no new proposition; that it is the doctrine of Jussieu, and of all botanists before his time. And we shall be but little more than repeating a prediction made by Jussieu precisely a hundred years since, if we say that the Compositæ of modern systematists is likely to prove at last a most unnatural congeries of tribes nearly alike in the accidents of a similar anthology and carpology, but having no genetical relation each to the others. But, as regards the Cichoriaceæ more especially, I am glad to note that Bentham and Hooker, whose great work on families and genera is the latest monument to unbending principles of carpology, admit that this, as a suborder or tribe, is by nature well circumscribed, and easily definable, as is no other tribe of what we call Compositæ.[1]

From these suggestions regarding ordinal affinities, I pass abruptly, in conclusion of this paper, to like principles as they may bear upon the species of plants. I have long been of the opinion that many species exist in nature, for which no specific characters can easily, or even by any known criterion, be found at all in the perfectly developed individual plant; in other terms, that completety and thoroughly distinct species may, and in some cases do, so closely simulate each other that, with ordinarily good specimens before him, the most acute botanist will fail to be able to separate them even as varieties. The most conclusive proofs I have of anything like this lie in the life histories of a few species of my own naming and defining. These, for obvious reasons, I here

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[1] "A nobis ascitos *Cichoriaceæ* solæ limitibus certioribus circumscriptæ sunt."—Gen. Pl. ii. 165.

leave without special mention; but I gladly take up instead, the defense of two or three familiar Californian species which Nuttall discovered, named and described, but which subsequent authors have not been able to retain even as varieties or forms; certain annual species of *Hosackia.*

On page 326 of the old Flora of North America he published the five following: *H. microphylla*, *nudiflora*, *strigosa*, *rubella* and *maritima.* Of these only *maritima* and *strigosa* have been adopted by subsequent authors, *maritima* having been rested by them upon its somewhat succulent herbage more than anything else, while the other four have been reduced to one, under the name of *strigosa;* but *microphylla*, it seems to me even the herbalist who never saw the living plants, might have been expected to retain, on account of the minute leaflets and the corollas, which are much larger than in any of the others, as well as of different shape. But the typical *strigosa*, along with *nudiflora* and *rubella* no closet student could learn to regard as distinct species, or even as nameworthy varieties. Having collected, a few seasons since, very mature and good specimens of three of these plants, in my search for possible characters over and above the apparently insufficient ones upon which Nuttall had founded them, I detected, what few men ever look for in closely related species of Leguminosæ, and what was still more surprising in plants not thought worthy of varietal rank, very decided seed-characters.

My three species were *H. strigosa*, *rubella* and *maritima.* The seeds of the latter I observed to differ from the others in being perfectly smooth; those of *rubella* were slightly roughed in a sort of minutely tuberculate fashion; that of *strigosa* was not only roughened in the same way, but had a curious narrow linear depression, or furrow, running across one side. In a dry bed of my garden I planted seeds of all three side by side. On the appearing of the cotyledons above ground I beheld with great satisfaction such differences as I shall now describe. Those of *H. maritima* were of a light green, perfectly smooth and of ovate

outline; those of *strigosa* were of a deeper green, strongly rugose, ovate in outline, each with a regular notch on one side, a little above the base, this corresponding to the furrow I had noticed on the seed; those of *rubella* were reddish and rugose, like those of *strigosa*, but were of cuneate-oblong shape, with no notch, or any trace of it.

In the course of the first four weeks of their development, any one would have called them different species. At the end of ten weeks one might again have doubted whether the two were not mere varieties or forms of the third; for even *maritima*, away from the sea, and upon ordinary dry ground, had largely lost its succulency, though its pale-green herbage and broader leaflets still marked it as unlike its neighbors.

This experience with these Hosackias illustrates how the most distinct and unquestionable species of plants may so closely simulate one another as to be indistinguishable in the maturer stages of growth: and also how a great botanist like Nuttall, a man naturally endowed with the keenest perceptibilities may, beyond all that, recognize by intuition as it were, species the essential visible or morphological characters of which, lying away back in the embryonic stages of the plant's development, he did not know.

New or Noteworthy Species.

V.

Potentilla frondosa. Stems clustered, erect or decumbent, 1½—3 feet high, conspicuously leafy throughout, the whole plant viscid-hirsute. leaves ample, the few radical with 3 or 4, the cauline with only 2 (rarely 3) pairs of leaflets; these oval or oblong, doubly incised but not deeply so, an

inch or two long, thin and finely rugose; stipules ovate-lanceolate, coarsely incised: flowers scattered in a leafy cyme: calyx short-campanulate (in fruit urceolate), the large spreading bractlets exceeding the proper segments and trifid at the broad apex: stamens 10, very unequal, all with subulate-dilated filaments: petals small, ligulate, erect or little spreading, white.

A rather surprising new species of the Horkelia type, first brought to my notice by a former pupil, Mr. Frank T. Swett, who conducted me to its habitat on his father's farm, near Martinez, Contra Costa County, California, in early May of the current year; and Dr. Parry has almost simultaneously brought it in from the Santa Cruz Mountains.

Although by floral character it is next of kin to *P. Californica*, the very type of Horkelia, this plant's great leafiness and few leaflets give it much the appearance of a rank *P. Norvegica*. The herbage exhales a heavy oily smell as disagreeable as that of *P. Californica* is sweet and pleasant.

TISSA[1] LEUCANTHA. Branches numerous from a fleshy fusiform perennial root, decumbent or more depressed, 6—10 inches long and, with the narrowly linear leaves, dark green and entirely glabrous, the inflorescence only, viscid-pubescent: stipules triangular-ovate, mostly very acute or acuminate: pedicels scattered, an inch long in fruit: sepals dark green, with conspicuous scarious margins: corolla ½ inch or more in breadth, pure white: the triangular apex of the large capsule well exserted: seed dark brown, very smooth, compressed, of rounded-pyriform outline, surrounded by a scarious wing as broad as the body of the seed.

Common on alkaline flats of the lower San Joaquin, California; abundant at Lathrop and about Byron Springs, also in similar soil along the eastern side of the Livermore Valley; flowering in March and April. A very showy species, most related to the common sea-side perennial, *T. macrotheca*.

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[1] See page 187 *supra;* also Britton, Bull. Torr. Bot. Club, xvi, 225.

PARONYCHIA PUSILLA. Annual, 1½—3 inches high, parted to the base into a few slender ascending branches, these with many short distichously arranged branchlets; the whole plant canescent with a minute pubescence which, under a strong lens, appears stiffly setulose. some of the setulæ appearing uncinate at tip: leaves oblong-lanceolate, acute, sessile, only a line and a half long: stipules ovate, minute (invisible except under a lens): flowers sessile, crowded in all the axils, minute, the sepals only a half-line long: seed black, smooth and lustrous.

The habitat of this perhaps very local plant is as singular as the species is peculiar. I gathered about a dozen specimens of it (all I could find), on an isolated mass of rock, scarcely three feet high or ten in breadth, which rises up in the midst of the grassy valley of a streamlet among the low hills a mile or two west of Bethany Station, on the lower San Joaquin, California; the date, April 30th, 1889. No other outcroppings of rock or ledge occur anywhere near the place; but the species may possibly recur in the Mt. Diablo foothills which begin a few miles to the westward.

ŒNOTHERA LEPTOCARPA = *Eulobus Californicus*, Nutt., Torr. & Gray, Fl. i. 515; *Œ. Californica* of page 290 *supra*, not of Watson. The disk lining the calyx-tube is even less manifest in this, the type of *Eulobus*, than in *Œ. crassiuscula*, as I observe from living plants now in flower in the garden of the University; so that the pendent-pods are the only thing left to distinguish the present plant from the species of *Œnothera* next of kin to it. Let him who would sustain *Eulobus* on this ground, separate our western species of *Arabis* into two genera for the same reason; and the same with *Thelypodium* and several more.

GREENELLA[1] RAMULOSA. Perennial, suffrutescent, intricately

[1] GREENELLA, Gray, Proc. Am. Acad. xvi. 80; Syn. Fl. vol. i. part 2, 55, 164.

branched, forming a tuft a foot broad and nearly as high, glabrous and very glutinous; branchlets angular, the monocephalous terminal ones divaricate: leaves linear-lanceolate, entire, cuneate below and sessile, about an inch long, on the branchlets under the heads reduced to very small recurved bracts: heads cylindrical, a line and a half long, the involucral scales firm, colorless except the green appressed and obtuse tips, imbricated; rays few, very short, white or yellowish, changing to rose-red.

Northern shore of San Bartolomé Bay, Lower California, 27 April, 1889; Lieut. Charles F. Pond, U. S. N.

Reminiscences of Major John E. Le Conte.

By Mary Graham.[1]

The best biographical notice of Major Le Conte which I have seen was published by his friend, William Sharswood of Philadelphia; a pamphlet of sixteen pages, including a list of some forty of his published scientific papers. This Necrology, as the author entitles it, is admirably written, as in the spirit of profound admiration and warm friendship; but he says: "Of his early history I know but little, except that he was of Huguenot descent."

Dr. Torrey told me that he remembered well Mr. Le Conte, the father of the subject of these Reminiscences; that this

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[1] My friend Miss Graham, who in earlier life, as a member of the household of Major Le Conte, was well acquainted with Dr. Torrey and other eminent scientific and literary persons who were often gathered there, has more than once delighted me with the rehearsal of such facts and incidents as these which, after long entreaty, she has noted down and given me, that I might place them upon record for the pleasure of others to whom Major Le Conte was not known personally.—E. L. G.

gentleman in 1802, and later, resided on Magazine Street (now Pearl Street), New York, and owned a country-seat called Daisy Hill, the location of which was about where 84th Street and 8th and 9th Avenues now are in the city above named; that he was a tall man, quite spare, of sallow complexion, in manner somewhat dignified and stern, insomuch that he, as a child,[1] stood somewhat in awe of him. He is said to have borne a striking resemblance to Hassler, founder of the U. S. Coast Survey.

The father of Dr. Torrey at one time lived in a house rented from Mr. Le Conte, and the juvenile John Torrey, accompanying the father on an occasional business errand to the Le Conte residence was more attracted by the two sons of the family, Messrs. Lewis[2] and John, who, although young men, perhaps seventeen and nineteen years of age, were already enthusiastic botanists, and well trained in the Latin and French languages.

Asa Gray, in his Biographical Notice of Dr. Torrey, accorded to Amos Eaton, an early teacher of botany and the compiler of the then popular Eaton's Manual, the praise of having instructed young Torrey in the rudiments of botany, making no mention of Le Conte; and yet, I had it from Dr. Torrey's own lips that his earliest interest in botanical and other natural history subjects was enkindled by association with the Le Conte youths, who were his seniors by about twelve and fourteen years; that long after this, when Torrey had become a Professor and had the young Asa Gray for his pupil and herbarium assistant, Major Le Conte, as a master of North American botany and most cordial friend, was still his own principal adviser and helper in difficult and doubtful matters appertaining to the science; and, that often during

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[1] The future Dr. Torrey of botanical renown must have been at that time a child of five or six years.—E. L. G.

[2] Lewis Le Conte was the father of the widely known and affectionately regarded Professors John and Joseph Le Conte of the University of California.—E. L. G.

the years between 1828 and 1840, when Major Le Conte, from a combination of malarial disease and rheumatism contracted upon military service in the South, was often confined to his bed for weeks, his pain and weakness did not prevent his receiving Prof. Torrey, who might have been seen again and again seated by the bedside of his friend, who, supported by pillows, discoursed upon the history and the systematic relations of the freshly gathered plants which were spread out before him on the bed.

Dr. Torrey's great merits as a young naturalist had received their first public recognition at Major Le Conte's instance: for he, as an esteemed officer in the U. S. Army and a particular friend of Mr. Calhoun, easily procured for his "young botanist" that appointment of Professor of Chemistry, Mineralogy and Chemistry in the U. S. Military Academy at West Point, which Dr. Torrey held for three years; and was then elected to the Chair at Columbia College, which he occupied thereafter to the end of his life.

Mr. Sharswood's Necrology appears to have been privately printed, and, being now a somewhat rare document, and at the same time the only at all worthy notice I have read of this eminent subject, I shall quote from it the following paragraphs, concerning his college career and subsequent military life:

"After having received a preparatory education, he entered Columbia College, in the city of New York, and when having nearly completed the usual four years' course, was overtaken by severe illness, which obliged him to leave before the period of graduation. His diploma was afterwards tendered him.

"He was enrolled as Assistant Topographical Engineer (with rank of Captain) in the army of the United States, on April 18th, 1818; ten years later, April 18th, 1828, as Brevet Major, for distinguished services; and on August 20th, 1831, resigned his commission.

"During the second war with Great Britain, he placed the city of Savannah under defense from the anticipated ingress

of the enemy. During this career as officer, he was charged with the surveys of Savannah River and the harbors of New York and Portsmouth."

At a very early period, perhaps in the first decade of the century, he and his brother Lewis were leading characters in a small circle of young gentlemen of literary or scientific turn, who met statedly at different places for social and scientific converse. Very possibly it was this informal association of young men which led to the organization subsequently of the New York Lyceum of Natural History, to the earliest volume of whose Annals the chief subject of these Reminiscences was an important contributor. Another member of this young gentlemen's circle was Washington Irving, from whom I had, many years afterwards, the following incident: A certain newly introduced associate one evening brought with him what seemed to him a curious piece of rock, and asked Irving if he knew what it was. He was at once referred to Mr. John Le Conte as being the geologist of the association; and he, taking the specimen in hand, at once disappointedly tossed it aside upon a table, remarking almost brusquely. "Nothing but a bit of old red sandstone"; his words and manner raising a laugh, and fixing upon him forever after with the members of the friendly and familiar circle, the soubriquet (each member had his soubriquet) of "Old Red Sandstone."

Athough it had been the botanical enthusiasm of the young Le Contes which had imparted its fire to the boy John Torrey by the time the latter was ten years old, and, although the two former were well known botanists before the eldest was more than twenty years of age, the first botanical paper published by John Le Conte appeared in 1811, under the patronage of the celebrated Dr. David Hosack. It was a Catalogue of the Plants of the Island of New York, the Title and Preface, as well as the list itself, in Latin. After this there followed, in due succession, a long list of original papers upon natural history subjects, zoology rather taking precedence over botany;

although in both sciences his contributions were always of original matter, and therefore of permanent value.

Two or three years after his receiving military commission he was married to a Miss Lawrence, of an old and highly respectable New York family. Her early death, in 1825, was an irreparable loss; but he took refuge in scientific work, studying more particularly the herpetology and botany of the Southern States, where his duties called him, and where he was eventually overtaken by that illness which, after several years' duration, impelled him to resign his commission, and from which he did not fully recover until long after his fiftieth year.

From this time until his death at the age of seventy-six, his scientific labors were turned upon the subject of entomology mainly, where his great abilities found exercise in original work of his own, and in directing and training, in the same line of work, his only son, the late John L. Le Conte of Philadelphia, who was, I think, the most eminent of American coleopterists.

His comfortable and hospitable mansion, as he presided in it between the years 1840 and 1860, was more or less the resort of the ablest scientists of the country, as well as of relatives and friends; for Major Le Conte, although a scholar and a close and careful student, was no recluse, but rather fond of the society of both old and young; and, although to strangers he sometimes gave the first impression of a little of the cold and majestic, all who knew him well were surer of nothing than of his kindliness and tenderness of heart.

In merry moods, I and my young lady companions and visitors were not in the least afraid making ourselves obtrusive; dared to drag forth from its old lurking place in an otherwise unused wardrobe, the gorgeous relics of his military days; and he condescended to answer our enquiries; telling us that that great military coat, heavily ornate with the insignia of office, he had worn for the last time, when he had served by appointment as one of the small Commission of army officers who received La Fayette, in the name of the

Government, when he landed on our shores for the last visit to America.

But in vain did we ply him with questions of how much that beautiful creature, a French cat, had cost him, which occupied always a red velvet divan (made for her use) in one of the libraries, and which we called the library cat, not only because she was always there, but because of a most amusing fondness she had for certain volumes bound in russian leather. These she would often lie down by, if one of them lay on the carpet, or she would climb high upon the shelves to get near them, to caress and purr to them, as if they had life. We inferred that some odor of the leather gave her particular satisfaction. In vain, I say, did we ply "uncle Jack" with queries about what extravagance he had gone into in the purchase of that cat, and the importation of her from across the sea. His only answers were good-humored evasions. But we one day encountered an old sailor whom we knew to have served sometimes in the capacity of an errand boy across the sea, for Major Le Conte. He told us he had paid fifty dollars for the cat, and had received ten for his care of her across the water. Perhaps it was our friend's French blood by virtue of which, like Frenchmen generally, he held dogs in abhorrence and was fond of cats. The many sleek and well fed cats which formed part of the domestic zoological collection, and were liable to follow their master, a half dozen together, to any part of the house, were an inconvenience, sometimes, to such guests as were averse to the feline race.

In one of our lady friends, Mrs. Spencer Baird, such an aversion was congenital, and amounted to an ungovernable horror. When upon a certain occasion Mrs. Holbrook, of Charleston, wife of the celebrated herpetologist, was with us, and a party of zoological friends were to be received in the evening, Mr. Baird gave warning to Major Le Conte that Mrs. B. could not possibly come unless reasonably assured that no cat should be allowed to appear where she might be. Accordingly, the whole feline concourse had been enticed into one of the cellars, well fed, and the doors closed down upon them

securely. Unluckily, the man who came at a late hour with the iced cream for the evening's repast, opened this very cellar, and out bounded every cat, some six or eight of them trotting off at once for the drawing-room. On the appearing of two or three of them at the door, Mrs. Baird, without a cry, arose and simply turned her face to the wall, while Mrs. Holbrook and others, knowing her idiosyncracy, drove them forth again, and they were speedily re-imprisoned for the night. Our friend, we know, did not recover from the nervous shock during the whole evening, but was kind enough to make light of the affair, and to be as cheerful during the remainder of the evening, as if nothing had occurred to disconpose or terrify her. Let no one make light of Mrs. Baird's peculiar horror. A brave king of France there was, I have forgotten which one, who would shriek wildly, "Un chat! un chat!" and fly from the room, if by anyone's neglect a cat made its appearance.

A pathetic indication of Major Le Conte's depth and tenderness of soul was his life-long silent devotion to the memory of her who for only four early happy years had been his wife. He had, in her declining health, taken her southward one autumn, and she had died and he had buried her in the cemetery of the Episcopal Church at Norfolk, Virginia. This had happened in the year 1825; and, I believe that every year thereafter, except when illness made it impossible, he made, though few knew it, a lonely pilgrimage to the grave. No one was ever asked to go with him; not her only living child, his son. Once, when I was with him in Norfolk, I asked, unaware of all the depth of his feeling, that he would show me the spot where her grave was. He replied quietly: "I will direct you how to find it."

Mr. Sharswood in his Necrology, to which reference has before been made, having disclaimed all knowledge of his friend's early history, adds, in the same paragraph: "Nor do I know at what period of life or under what influence he assumed the faith of the Holy Catholic Church."

A wave of the Tractarian Movement which, between 1840

and 1850, carried the flower of the English Protestant clergy, and many of the aristocracy, back to the Mother Church of Rome, had touched our shores; and Major Le Conte's conversion was only one of many which took place in those years among the intelligent and cultivated higher classes in America; including such men as the Protestant Bishop Ives, Rev. James Roosevelt Bayley, and the early friend and associate of R. W. Emerson, Orestes Brownson, whom a great British critic, himself as far as possible from being a Catholic, pronounced "The master mind of America." The celebrated Mrs. Seton of New York, who had still earlier become a Catholic, and who was the foundress, in America, of the Sisters of Charity, had been a relative of the Le Contes; and her wonderful life and personality had left their deep impression on all who had known her.

The Rev. Mr. Bayley also, by birth, by fortune, and by mental and moral endowments conspicuous among the younger clergy of the Episcopal Church in New York, afterwards a convert to the Old Faith and successively Bishop of Newark and Archbishop of Baltimore, was not only a relative of Major Le Conte, but a particular friend; and the writer well remembers how, on his first call on his naturalist kinsman, after the ordination to Catholic priesthood had taken place, the latter, knowing how other Protestant relatives no longer gave him welcome, Major Le Conte, himself far above all the littlenesses of prejudice, assured him that at *his* home he would receive henceforward the same old welcome as before. At this time, 1844, Major Le Conte was just sixty years of age; and in 1846, choosing the great national holiday for this solemn, yet, to his heartily convinced mind and soul, most happy procedure, he was received into the Catholic Church on the morning of the 4th of July. In the last conversation I ever had with the late Cardinal McCloskey, he said he remembered distinctly the hour, and had himself been very deeply impressed by the sight of the venerable and military looking Huguenot as he entered the church leaning on the arm of his dear relative Father Bayley, advanced to the altar-

rail and there humbly kneeling, made his solemn abjuration of Protestantism, and received conditional baptism at the hands of the Archbishop.

Fourteen years later, and they had been the years of a serene and happy evening of life, on the 21st of November, 1860, this most learned, gifted, amiable and pious gentleman, almost a prince among American scientists of his time, resigned his life in peace, at the age of seventy-six.

ERRATA.

Page 8, line 6, for here, read been.
" 21, " 16, " P. canescens, Gray, read P. canescens, Benth.
" 52, " 2, " set, read set aside.
" 64, " 25, " S. umbellatum, read C. umbellatum.
" 70, " 14, " Ænothera, read Œnothera.
" 77, " 34, " lines, read times.
" 88, " 20 and 21, for augustifolium, read angustifolium.
" 90, " 18, for Bæria, read Baeria.
" 99, " 5, " sanlotinoides read santolinoides.
" 149, " 17, " not even, read even.
" 144, " 20, " latter, read later.
" 149, " 12, " Swendenborg, read Swedenborg.
" 170, " 13, " lack, read lacks.
" 177, " 29, " synonimis, read synonymis.
" 177, " 30, " observatioribus, read observationibus.
" 266, " 15, " Hartev, read Hartw.
" 284, " 1 and 10, for Bæria, read Baeria.
" 286, " 2, for E. lanceolata, read C. lanceolata.
" 209, " 9, " D. Media, read D. Meadia.

Allium 166
crispum,
dichlamydeum, 166
peninsulare, 165
serratum, 166
unifolium, 165

INDEX.

New genera and species in **bold-face** type ; synonyms in *italics*.

Abronia
maritima, 92.
umbellata, 98, 289.
Achætogeron **Forreri,** 155.
Achillæa Millefolium, 90.
Adiantum capillus veneris, 208.
Ægochloa
atractyloides, 138.
cotulæfolia, 132.
intertexta, 131.
pubescens, 133.
pungens, 133.
Agave Sebastiana, 192, 208.
Agrimonia agrimonioides, 192.
Agropyrum repens, 93.
Alisma
Plantago aquatica, 293.
Plantago, 293.
Allium, 165-166
Allocarya
Austinæ, 18.
Californica, 20.
Chorisiana, 13.
Cooperi, 19.
Cusickii, 17.
diffusa, 14.
Echinoglochin, 15.
Hickmani, 13.
hirta, 161
hispidula, 17.
humistrata, 16.
humilis, 17.
lithocarya, 12.
mollis, 20.
penicillata, 18.
plebeia, 16.
procumbens, 17.
Scouleri, 18.
scopulorum, 16.
scripta, 142.
sessilifolia, 17.
stipitata, 19.
trachycarpa, 14.
uliginosa, 14.
Alsine media, 179.
Amblyopappus pusillus, 90, 265.
Amsinckia lycopsoides, 91.
Anemone
Grayi, 48.
Oregana, 48.
patens, 255.
Antirrhinum Nuttallianum, 92.
Apiastrum angustifolium, 88.
Aplopappus ericoides, 89.
Arabis
filifolia, 289.
lyrata, 255.
pectinata, 287.
purpurascens, 161.

Arctostaphylos
bicolor, 205.
myrtifolia, 34.
nummularia, 35.
Arethusa bulbosa, 256.
Artemisia
Californica, 90.
vulgaris, 179.
Aster Kumlieni, 259.
Astragalus
anemophilus, 33.
candidissimus, 162.
caryocarpus, 173.
circumdatus, 173.
Daleæ, 153.
fastidiosus, 201.
insularis, 201.
leucopsis, var. **brachypus,** 33, 87
Magdalenæ, 162.
Miguelensis, 33, 87.
Pondii, 288.
triflorus, 288.
vestitus, 33.
Atænia
Gairdneri, 274.
Howellii, 274.
Kelloggii, 274.
Oregana, 274.
Atriplex
argentea, 40, 264.
Californica, 93, 207.
dilatata, 264.
expansa, 264.
leucophylla, 93.
nodosa, 40.
Avena fatua, 93.
Azalea, 278.
Baccharis sarothroides, 204.
Baeria
consanguinea, 284.
Palmeri, var. Clementina, 90.
Bebbia juncea, 204.
Bigelovia
Bigelovii, 192.
tridentata, 204.
veneta, 89, 204.
—— var. **sedoides**, 89.
Boisduvalia
densiflora, 279.
Douglasii, 279.
Brasenia, 255.
Brassica campestris, 85.
Brickellia
cedrosensis, 203.
Knappiana, 260.
Brodiæa
capitata, 266.
insularis, 93, 266.
Palmeri, 292.
Bromus sterilis, 179.
Bryonia alba, 179.

Cabrillo, on San Miguel, 76.
Cacalia
tussilaginoides, 219.
Palmeri, 219.
Calais **pluriseta,** 34.
Calandrinia maritima, 263, 289.
Calceolus, 221.
Calochortus
lilacinus, 159.
Madrensis, 225.
venustulus, 158, 225.
Calopogon pulchellus, 256.
Caltha palustris, 179.
Calyptridium
andum, 64.
paniculatum, 47.
quadripetalum, 141.
umbellatum, 64.
Campanula
aurita, 221.
rotundifolia, 179.

Capsella divaricata, 85.
Cardamine
filifolia, 30.
gemmata, 162.
Nuttallii, 162.
Carex angustata, 208.
Carpenteria Californica, 67, 141.
Carum
Gairdneri, 274.
Howellii, 274.
Kellogii, 274.
Oreganum, 274.
Carya, synonym of Hicoria, 188.
Cassandra, 256.
Castalia tuberosa, 255.
Castilleia
affinis, 92.
hololeuca, 38, 92.
Ceanothus, 245.
Americanus, 247.
crassifolius, 86.
decumbens, 247.
ovatus, 247.
papillosus, 247.
sanguineus, 247.
Cedronella
aurantiaca, 157.
cana, 164.
coccinea, 157.
rupestris, 164.
Centaurea Melitensis, 90.
Cereus
Emoryi, 203.
Engelmanni, 203.
Chænactis **lacera,** 291.
Cheiranthodendreæ, 48.
Chelidonium majus, 179.
Chenopodina Moquini, 264, 289.
Chenopodium
Californicum, 93.
murale, 93, 267.
Chrysanthemum segetum, 179.
Cichoriaceæ, a Natural Order, 298.
Cicuta
Californica, 271.
maculata, 271.
virosa, 271.
Ciquimuymu, aboriginal name, 79.
Circæa Lutetiana, 179.
Clarkia
Breweri, 141.
concinna, 140.
Saxeana, 140.
Classification, J. D. Hooker on, 295.
Claytonia, limitation of, 46.
Clematis pauciflora, 200.
Cleome Isomeris, 200.
Cnicus
amplifolius, 70.
edulis, 71.
occidentalis, 91.
Collomia
debilis, 127.
diversifolia, 128.
gracilis, 141.
grandiflora, 127.
heterophylla, 128.
linearis, 128.
Rawsoniana, 221.
tenella, 129.
tinctoria, 129.
Collinsia
bicolor, 53.
floribunda, 55.
tenella, 55.
Compositæ, limitation of, 298.
Convolvulus macrostegius, 92.
Coreocarpus **involutus,** 290.
Corethrogyne
cana, 29.
detonsa, 29.
filaginifolia, var. **robusta,** 89.

Cotyledon
lanceolata, 88.
lanceolata, 264.
linearis, 285.
Cressa cretica, 92.
Cryptanthe
affinis, 119.
ambigua, 113.
angustifolia, 112.
barbigera, 114.
Cedrosensis, 117, 206.
Clevelandi, 117.
congesta, 111.
crassisepala, 112.
cycloptera, 120.
denticulata, 114.
dimorpha, 112.
dumetorum, 112.
echinella, 115.
Fendleri, 120.
flaccida, 115.
foliosa, 113.
geminata, 119.
glareosa, 111.
glomerata, 110.
glomeriflora, 116.
hispidissima, 118.
intermedia, 114.
Jonesii, 113.
leiocarpa, 117.
linearis, 111.
maritima, 117, 291.
microcarpa, 111.
micromeres, 113.
microstachys, 116.
Mohavensis, 120.
muriculata, 113.
nemaclada, 118.
oxygona, 120.
Pattersoni, 120.
patula, 265.
policarpa, 114.
Pondii, 291.
pterocarya, 120.
pusilla, 115.
racemosa, 115.
ramosa, 115.
ramosissima, 116.
Rattani, 160.
rostellata, 116.
sparsiflora, 116.
Texana, 112.
Torreyana, 118.
Utahensis, 120.
Watsoni, 120.
Cuphea
mesochloa, 141.
viridostoma, 141.
Cuscuta patens, 292.
Cynoglossom glomeratum, 58.
Cypripedium spectabile, 256.

Dalea
cyanea, 153.
megacarpa, 202.
Daucus pusillus, 88.
Decodon verticillatus, 42.
Delphinium
apiculatum, 285.
pauperculum, 284.
recurvatum, 285.
variegatum, 285.
Dendromecon
flexile, 43.
Harfordi, 43.
rigidum, 43.
Dicentra
chrysantha, 187.
ochroleuca, 187,
pauciflora, 187.
uniflora, 187.
Diclytra
chrysantha, 187.
ochroleuca, 187.
pauciflora, 187.
uniflora, 187.

Diclytra chrysantha, 187.
Diplacus
parviflorus, 36.
puniceus, 36.
stellatus, 206.
Diplostephium canum, 29.
Distichlis spicata, 93.
Dodecatheon
Clevelandi, 213.
cruciatum, 213.
ellipticum, 210.
Hendersoni, 210.
Jeffreyi, 210.
Meadia, 209.
patulum, 211.
Draba Caroliniana, 255.
Dudley's Cayuga Flora, 41.
Dysodia anthemidifolia, 291.

Echidiocarya Arizonica, 21.
Echinocactus Emoryi, 203.
Echinocystis
echinata, 192.
fabacea, 3.
Gilensis, 3.
Guadalupensis, 3.
macrocarpa, 3.
Mara, 3.
muricata, 3.
Oregana, 3.
Watsoni, 3.
Echinospermum
Greenei, 15.
leiocarpum, 117.
Echium vulgare, 177.
Edosmia
Gairdneri, 274.
Oregana, 274.
Eleocharis vs. Heleocharis, 186.
Elymus condensatus, 93.
Encelia
conspersa, 265, 268.
stenophylla, 204.
Epilobium
glaucum, 225.
Oreganum, 225.
Eremocarya
lepida, 59.
micrantha, 59.
Erica vulgaris, 177.
Erigeron
angustatus, 219.
glaucus, 89.
inornatus, 174.
Sonnei, 218.
stenophyllus, 89.
petrophylus, 218.
viscidulus, 174.
Eriogonum
fasciculatum, 207.
grande, 38.
intricatum,
molle, 207.
nudum, 39.
Pondii, 267, 289
rubescens, 39, 92.
tripodum, 39.
Eriophyllum confertiflorum, 90, 205
Eritrichium
angustifolium, 112.
barbigerum, 114.
Californicum, 9, 20.
Calfornicum, var. *subglochidiatum*, 16, 17.
chorisianum, 13.
circumscissum, 59.
clandestinum, 111.
congestum, 111.
connatifolium, 13.
Cooperi, 19.
crassisepalum, 112.
cryptanthum, 111
dimorphum, 112.

fulvocanescens, 58.
glareosum, 111.
glomeratum, 58.
holopterum, 58.
humile, 17.
intermedium, 114.
Jamesii, 57.
Kingii, 23.
leiocarpum, 120.
leucophæum, 58.
micranthum, 59.
micromeres, 113.
molle, 20.
muriculatum, 113.
oxycaryum, 116.
plebeium, 16.
procumbens, 17.
pterocaryum, 120.
pusillum, 115.
racemosum, 115.
ramosum, 115.
Sonderi, 19.
sessilifolium, 17.
setosissimum, 58.
Texanum, 112.
uliginosum, 112.
virgatum, 58.

Erodium
cicutarium, 86.
moschatum, 86.

Eryngium
aquaticum, 185.
yuccæfolium, 185.

Erysimum
insulare, 85.

Eschscholtzia
Austinæ, 44.
cæspitosa, 44.
Californica, 60.
crocea, 44, 171.
elegans, 170.
glauca, 45.
leptandra, 170.
maritima, 60, 85.
Mexicana, 170.
minutiflora, 169.
modesta, 169.
ramosa,
rhombipetala, 169.
tenuisecta, 169.

Eucrypta chrysanthemifolia, 91.

Eulobus Californicus, 302.

Eunanus
Austinæ, 36.
Cusickii, 36.
mephiticus, 36.
subsecundus, 37.

Euphorbia, 231.
albomarginata, 208.
Bartolomæi, 290
benedicta, 263
misera, 208.

Festuca Myurus, 93.

Feuillé, Rev. Fr., on properties of Lobelia Tupa, 296.

Fouquiera
spinosa, 289.
splendens, 289.

Frankenia
grandifolia, 86.
Palmeri, 200, 263.

Franseria
bipinnatifida, 90.
camphorata, 49.
—— var. leptophylla, 204.
chamissonis, 90.
chenopodiifolia, 204, 290.

Galax aphylla, 193.

Galium
buxifolium, 88.
Californicum, 34.
flaccidum, 34.
Miguelense, 34.
uncinulatum, 34.

Galvesia juncea, 49, 206.

Gentiana **superba,** 155.
Geraniaceæ, Trelease's study of, 245
Geranium Robertianum, 180.
Gilia
aristella, 129.
atractyloides, 138.
Brandegei, 126.
Breweri, 137.
cotulæfolia, 132.
debilis, 127.
densiflora, 53.
divaricata, 136.
filicaulis, 134.
gracilis, **141.**
heterodoxa, 134.
heterophylla, 128.
intertexta, 131.
Larseni, 127.
leptotes, 129.
leucocephala, 131.
mellita, 71, 72
mellita, 134.
micrantha, 91.
minima, 131.
parvula, 72.
parvula, 134.
prostrata, 131.
pubescens, 133
pungens, 133.
Sessei, 128.
squarrosa, 133.
Veatchii, 205.
viscidula, 133.
Gnaphalium Sprengelii, 89.
Godetia
micropetala, 32.
purpurea, 32.
Grindelia latifolia, 89.
Greenella **ramulosa,** 302.
Gutierrezia
Euthamiæ, 203.
gymnospermoides, 234.
Sarothræ, 203.
Haller, Hortus Gottingensis, 276.
Harfordia fruticosa, 197, 206.
Hauya arborea, 202.
Hazardia
cana, 29.
detonsa, 29.
serrata, 29.
Hedeoma **jucunda,** 156.
Hedera Helix, 180.
Helianthus **invenustus,** 284.
Helosciadium Californicum, 272.
Heliotropium Curassavicum, 91.
Hemizonia
fasciculata, 205.
Streetsii, 261, 265.
Hesperochiron **ciliatus,** 282.
Heteromeles arbutifolia, 77, 88.
Hicoria vs. *Carya*, 188.
Hookera **leptandra,** 74.
Hordeum
distichum, 180.
murinum, 180.
Horkelia
Bolanderi, 103.
Californica, 100.
capitata, 104.
congesta, 104.
congesta **var.** *latiloba*, 104.
cuneata, 101.
fusca, 103.
Gordoni, 106.
hirsuta, 104.
Kelloggii, 100, 101.
Parryi, 102.
parviflora, 104.
purpurascens, 105.
sericata, 104.
tenuiloba, 105.
Tilingi, 105.
tridentata, 105.
Horsfordia, 48.

Hosackia
flexuosa, 202.
maritima, 288, 299.
microphylla, 299.
nudiflora, 299.
rubella, 299.
strigosa, 299.
Hunnemannia, 61.
Hyoscyamus niger, 180.
Hypericum
gentianoides, 188.
parvulum, 154.
Sarothra, 188.
Ingersoll, Ernest, on Harvard's Botanists, 238.
Ionidium concolor, 42.
Isomeris arborea, 200.
Iva Hayesiana, 204.
Ivesia
Baileyi, 105.
depauperata, 105.
Gordoni, 106.
gracilis, 105.
Kingii, 105.
Lemmoni, 104.
Muirii, 106.
Pickeringii, 105.
pinnatifida, 104.
pygmæa, 106.
santolinoides, 106.
tridentata, 105.
unguiculata, 105.
Utahensis, 162.
Webberi, 105.
Jaumea carnosa, 90.
Juncus
acutus, 180.
Balticus, 93.
robustus, 208.
Juniperus Cedrosanus, 207.
Krynitzkia
affinis, 119.
ambigua, 113.
angustifolia, 112.
barbigera, 114.
Californica, 20.
Cedrosensis, 117.
Chorisiana, 14.
circumscissa, 59.
Cooperi, 19.
crassisepala, 112.
cycloptera, 120.
denticulata, 114.
dichotoma, 60.
dumetorum, 112.
Fendleri, 120.
foliosa, 113.
fulvocanescens, 58.
glomerata, 58.
holoptera, 58.
intermedia, 114.
Jamesii, 57.
Jonesii, 113.
leiocarpa, 117.
leucophæa, 58.
lithocarya, 13.
maritima, 117.
micrantha, 59.
micrantha var. *lepida*, 59
micromeres, 113.
microstachys, 116.
Mohavensis, 120.
mollis, 20.
muriculata, 113.
oxycarya, 116.
oxygona, 120.
Palmeri, 57.
Pattersoni, 120.
plebeia, 16.
pterocarya, 120.
pusilla, 115.
racemosa. 115.
ramosa, 115.
ramosissima, 116.

rostellata, 116.
Scouleri, 19.
scricea, 58.
setosissima, 58.
sparsiflora, 116.
Texana, 112.
Torreyana, 118.
trachycarpa, 14.
Utahensis, 120.
virgata, 58.
Watsoni, 120.
Kumlienia, 260.
Lactuca virosa, 296.
Lapathum, 231.
Larix Americana, 255.
Lavatera.
assurgentiflora. 77, 86.
venosa, 261, 263.
Layia platyglossa, 90.
Lepidium lasiocarpum, 86, 263.
Lepigonum.
macrothecum, 86.
tenue, 63.
Leptosyne gigantea, 90.
Lesquerella, criticism of, 250.
Lilium, Kellogg's species of, 150.
Lithospermum
circumscissum, 59.
muricatum, 15.
plebeium, 16.
tubuliflorum, 155,
Ligustrum vulgare, 180.
Linaria vulgaris, 180.
Linnæa borealis, 256.
Linum catharticum, 180.
Lobelia.
amœna, 297.
Dunnii, 297.
Palmeri, 297.
Rothrockii, 297.
Tupa, 296.
urens, 296.
Lupinus
arboreus, 87.
capitatus, 171.
Chamissonis, 87.
polycarpus, 171.
Pondii, 288.
malacophyllus, 215.
ligulatus, 215.
Franciscanus, 216.
variicolor, 216.
versicolor, 216.
pachylobus, 65.
Lycium
brevipes, 292.
Californicum, 265.
Cedrosense, 268.
Hassei, 222.
Malacothrix
Clevelandi, 205.
incana, 91.
indecora, 91.
tenuifolia, 91.
Malvaceæ, Gray's Revision of, 48.
Malva parviflora, 86.
Mamillaria
Goodridgii, 203, 265.
Pondii, 268.
Mara muricata, 3.
Marrubium vulgare, 92.
Meconopsis heterophylla, 168.
Medicago
denticulata, 87.
sativa, 87.
Megarrhiza
Californica, 3.
Gilensis, 3.
Guadalupensis, 3.
macrocarpa, 3.
Mara, 3.
muricata, 3
Oregana, 3.

Melilotus, parviflora, 87.
Mentha aquatica, 180.
Mentzelia cordata, 202.
Mesembrianthemum
æquilaterale, 88.
crystallinum, 82, 88, 264.
Mimulus
arvensis, 37.
Bigelovii, 36.
cardinalis, 206.
guttatus, 37.
glareosus, 282.
luteus, 37.
lyratus, 38.
microphyllus, 37.
subsecundus, 37.
Mirabilis Californica, 207, 266.
Mitella
diversifolia, 32.
ovalis, 32.
Monardella thymifolia, 206.
Moneses, Nomenclature of, 278.
Montia, 46.
Muilla
coronata, 165.
transmontana, 73.
Myosotis
Californica, 20.
Chorisiana, 13.
flaccida, 115.
glomerata, 58.
humilis, 17.
leucophæa, 58.
linearis, 111.
Scouleri, 19.
suffruticosa, 57.

Navarretia
atractyloides, 138.
Breweri, 137.
cotulæfolia, 132.
divaricata, 136.
filicaulis, 134.
foliacea, 138.
hamata, 139.
heterodoxa, 134.
heterophylla, 128, 130.
intertexta, 131.
involucrata, 130.
leptantha, 283.
leucocephala, 131.
mellita, 134,
minima, 131.
mitracarpa, 135.
nigellæformis, 132.
parvula, 134.
peninsularis, 136.
prolifera, 135.
prostrata, 130.
pubescens, 133.
pungens, 133.
squarrosa, 133.
subuligera, 137.
tagetina, 137.
viscidula, 133.
Neillia opulifolia, 42
Nelumbo lutea, 255.
Nemophila aurita, 268.
Nesæa verticillata, 42.
Notholæna candida, 208.
Nuttall, in the Torrey & Gray Flora, 240.
Nymphæa alba, 180.
Œnothera
bistorta, 88.
Californica, 302.
Cedrosensis, 202.
cheiranthifolia, 88.
crassifolia,
crassiuscula,
leptocarpa, 302.
nitida, 70.
Oligomeris subulata, 86.
Opuntia Engelmanni, 88.

Oreocarya
fulvocanescens, 58.
glomerata, 58.
holoptera, 58.
leucophæa, 58.
Palmeri, 57.
sericea, 58.
setosissima, 58.
suffruticosa, 57.
virgata, 58.
Origanum vulgare, 180.
Orthocarpus densiflorus, 92.
Palmerella, 297.
Papaver
Californicum, 167.
heterophyllum, 168
Lemmoni, 168.
Rhœas, 180.
Paronychia **pusilla,** 302.
Pastinaca sativa, 180.
Pentstemon
arenarius, 282.
Cedrosensis, 206.
deustus, 282.
leucanthus, 72.
Perityle Fitchii, 205, 265, 291.
Petalonyx linearis, 203.
Permanency of specific names, 227.
Phacelia
Arthuri, 224.
Californica, 142.
circinata, 142.
leucantha, 175.
nemoralis, 141.
rugulosa, 175.
scabrella, 35, 91.
suaveolens, 223.
viscida, 91.
Phalaris canariensis, 93.
Phlox gracilis, 141
Photinia arbutifolia, 202.
Physalis pedunculata, 268
Physocarpus opulifolius, 42.
Pinus muricata, 207.
Piptocalyx
circumscissus, 59.
dichotomus, 60.
Plagiobothrys
canescens, 21.
canescens var. **apertus,** 21.
glomeratus, 22.
hispidus, 22.
Jonesii, 23.
Kingii, 23.
microcarpus, 21.
Pringlei, 21.
Plantago
aquatica, 293.
hirtella, 92.
Patagonica, 92, 266.
Platystemon Californicus, 85.
Pogonia ophioglossoides, 256.
Polemonium
Brandegei, 126.
carneum, 124.
cœruleum, 125.
confertum, 126.
filicinum, 124.
flavum, 124.
foliosissimum, 125.
humile, 125.
micranthum, 123.
pectinatum, 125.
pulchellum, 124.
reptans, 124.
viscosum, 125.
Polygonum Virginianum, 187.
Polypodium vulgare, 181.
Polypogon Monspeliensis, 93.
Pontederia cordata, 255.
Populus
alba, 181.
nigra, 181.

Porophyllum gracile, 205.
Potamogeton perfoliatus, 181.
Potentilla
Andersoni, 104.
Anserina, 80, 87, 95.
Arizonica, 104.
Baileyi, 105.
Bolanderi, 103.
Californica, 100.
capitata, 104.
ciliata, 103.
Clevelandi, 102.
congesta, 104.
daucifolia, 160.
decipiens, 106.
depauperata, 105.
Douglasii, 103.
elata, 100.
frondosa, 300.
fruticosa, 95.
fusca, 103.
glandulosa, 96.
Gordoni, 106.
gracilis, 96.
Howellii, 104.
Kelloggii, 101.
Kingii, 105.
Lemmoni, 104.
Lindleyi, 101.
Muirii, 106.
multijuga Lehm.
Newberryi, 105.
Nuttallii, 104.
Parryi, 102.
parviflora, 104.
pentandra, 97.
Pickeringii, 105.
Plattensis, 106.
puberula, 102.
purpurascens, 105.
pygmæa, 106.
rupestris, 106.
santolinoides, 106.
saxosa, 171.
sericata, 104.
tenuiloba, 105.
Tilingi, 105.
unguiculata, 105.
Utahensis, 162.
verticillaris, 96.
Webberi, 105.
Protea, Linnæan specific names of, 228.
Ptelea
angustifolia, 217.
crenulata, 216.
trifoliata, 217.
Quercus.
Morehus, 145.
parvula, 40.
Ranunculus
acris, 236.
aquatilis, 181, 236.
auricomus, 181.
Bloomeri, 270.
bulbosus, 181.
Deppei, 85.
Flammula, 181.
Forreri, 154.
rhomboideus, 255.
Rhamnus
Californica, 160.
cathartica, 181.
insularis, 201.
rubra, 80, 160.
Rhododendron. Gray's nomenclature of, 278.
Rhus
diversiloba, 87.
integrifolia, 78, 87, 201.
laurina, 201.
Lentii, 201.
Ribes
amictum,
Marshallii, 31.
Menziesii, 225.

nigrum, 181.
Victoris, 224.
Rosa canina, 181.
Rubus ursinus, 87.
Rumex
maritimus, 92.
salicifolius, 92.
Russelia
retrorsa, 176.
sarmentosa, 176.
Salicornia ambigua, 93.
Salvia
aliena, 157.
Cedrosensis, 206.
Forreri, 156.
Scirpus riparius, 208.
Senecio
aphanactis, 220.
astephanus, 174.
Californicus, 220.
Cedrosensis, 197, 205.
Greenei, 174.
hydrophilus, 220.
—— var. **Pacificus, 220.**
Rusbyi, 174.
sylvaticus, 220.
vulgaris, 181.
Sidalcea
Hickmani, 139.
malvæflora, 86.
Silene
antirrhina, 86.
Gallica, 86.
laciniata, 63.
simulans, 63, 86.
Simmondsia Californica, 208.
Sisymbrium pinnatum, 200.
Sisyrinchium bellum, 93.
Smilacina 281.
Solanum Douglasii, 92.
Solea concolor, 42.
Sonchus asper, 181.
Sonnea
foliacea, 222.
glomerata, 22.
Harknessii, 23.
hispida, 22.
Jonesii, 23.
Kingii, 23.
Sphacele, **fragrans, 38.**
Sphæralcea **fulva, 201.**
Spiræa opulifolia, 192.
Stachys
acuminata, 73.
bullata, 73.
Californica, 73.
venulosa, 157.
Staphylea geniculata, 163.
Stephanomeria virgata, 91.
Streptanthus
albidus, 62.
barbiger, 217.
Suæda
Moquini, 264, 289.
Torreyana, 93, 264.
Syrmatium
patens, 87.
nudatum, 173, 202.
Tanacetum vulgare, 182.
Thalictrum
Fendleri, 166.
minus, 181.
platycarpum, 166.
polycarpum, 167.
Thelypodium
rigidum, 62.
lasiophyllum, 63.
Thysanocarpus conchulifer, 31.
Tissa
leucantha, 301.
macrotheca, 301.
Tithymalus, 231.

Tonella
collinsioides, 55.
floribunda, 55.
Tournefortia, 231.
Tovara, 187.
Trifolium
amplectens, 6, 7.
arvense, 4.
columbinum, 4.
depauperatum, 6, 7.
diversifolium, 7.
exile, 6.
filipes, 66.
fragiferum. 182.
fucatum, 172.
laciniatum, 7.
lineare, 6.
longipes, 5.
olivaceum, 4.
pratense, 182.
quercetorum, 172.
Rusbyi, 5.
scabrellum, 159.
stenophyllum, 6.
tridentatum, 87.
triflorum, 5.
Triteleia
Hendersoni,
hyacinthina, 199.
Palmeri, 292.
Trixis angustifolia, 205.
Tropidocarpum
capparideum, 217.
gracile, 217.
Troximon
elatum, 71.
grandiflorum, 91.
Marshallii, 174.
Umbelliferæ, history of, 276.
Unifolium
liliaceum, 280.
sessilifolium, 281.
stellatum, 281.
Urtica
Californica, 281.
Lyallii, 281.
urens, 182.
Valeriana **rhomboidea,** 154.
Veatchia Cedrosensis, 198, 201.
Verbascum nigrum, 182.
Verbena
lilacina, 206.
prostrata, 92.
subuligera, 156.
Verbesina hastata, 204.
Vesicaria, Watson's paper on, 249.
Vicia exigua, 87.
Viguiera lanata, 204.
Viola
canina, 182.
tricolor, 182.
Viscainoa geniculata, 163, 208.
Xanthocephalum gymnospermoides, 234.
Zauschneria
Californica, 27, 88.
Californica var. *microphylla*, 26, 27.
cana, 28.
Mexicana, 26.
latifolia, 25.
tomentella, 26.
villosa, 27.
Zebrina **pumila,** 157.